HP ProLiant DL388e Gen8 Server User Guide

Abstract

This document is for the person who installs, administers, and troubleshoots servers and storage systems. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

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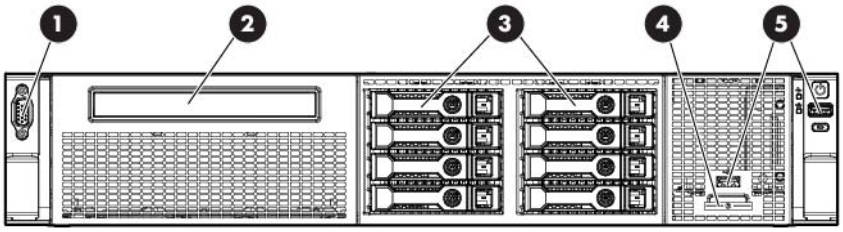
Component identification

Front panel components

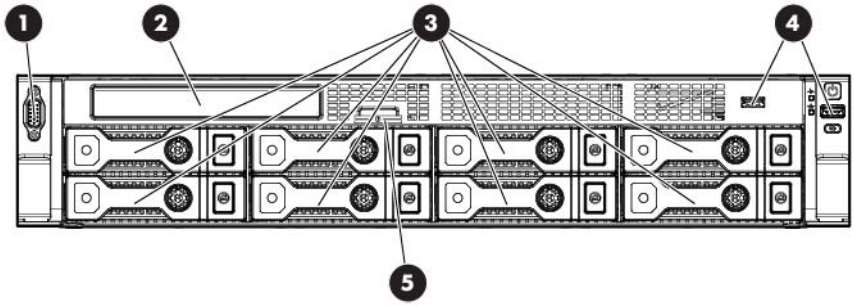
- 8-bay SFF drive model



Item	Description
1	Video connector
2	Optical drive (optional)
3	SFF drives
4	Serial number/iLO information pull tab*
5	USB 2.0 connectors

* The serial number/iLO information pull tab is double-sided. The top side shows the server serial number, and the reverse side shows the default iLO account information. The same information is printed on a label attached to the chassis.

- 8-bay LFF drive model



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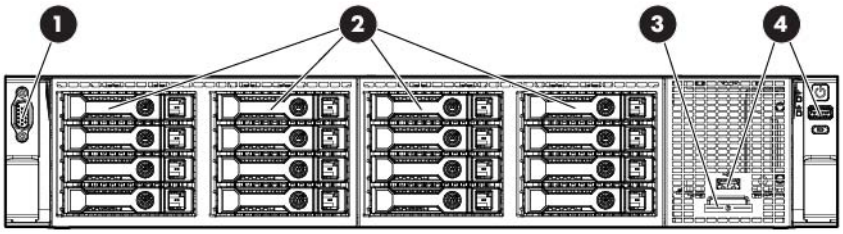
1	Video connector
2	Optical drive (optional)
3	LFF drives
4	USB 2.0 connectors
5	Serial number/iLO information pull tab*

* The serial number/iLO information pull tab is double-sided. The top side shows the server serial number, and the reverse side shows the default iLO account information. The same information is printed on a label attached to the chassis.

- 8+8-bay SFF drive model



Item	Description
1	Video connector
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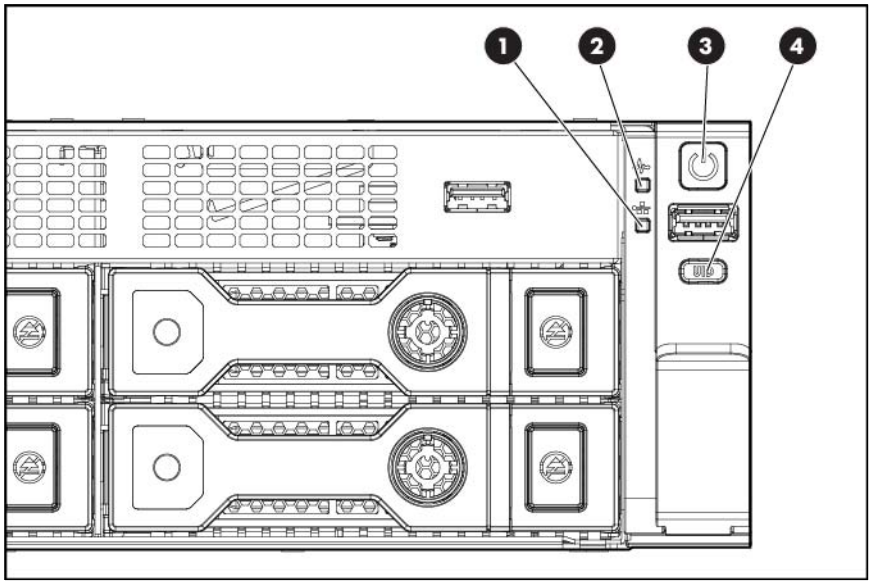
3	Serial number/iLO information pull tab*
4	USB 2.0 connectors

* The serial number/iLO information pull tab is double-sided. The top side shows the server serial number, and the reverse side shows the default iLO account information. The same information is printed on a label attached to the chassis.

Front panel LEDs and buttons



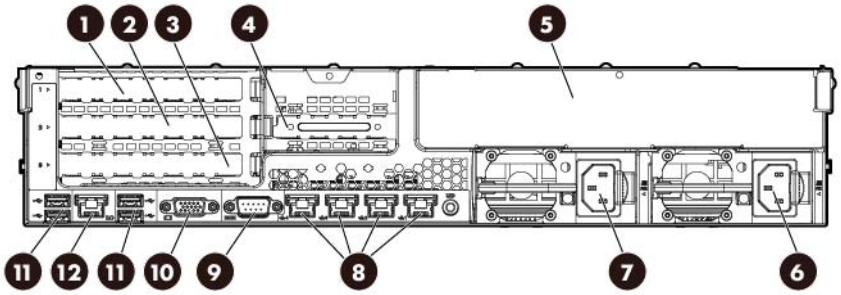
Item	Description	Status
1	NIC status LED	Solid green = Link to network Flashing green (1 Hz/cycle per sec) = Network active Off = No network activity
2	Health LED	Solid green = Normal Flashing amber = System degraded Flashing red (1 Hz/cycle per sec) = System critical Fast-flashing red (4 Hz/cycles per sec) = Power fault*

Item	Description	Status
3	Power On/Standby button and system power LED	Solid green = System on Flashing green (1 Hz/cycle per sec) = Performing power on sequence Solid amber = System in standby Off = No power present**
4	UID button/LED	Solid blue = Activated Flashing blue (1 Hz/cycle per sec) = Remote management or firmware upgrade in progress Off = Deactivated

* To identify components in a degraded or critical state, see the Systems Insight Display LEDs, check iLO/BIOS logs, and reference the server troubleshooting guide.
** Facility power is not present, power cord is not attached, no power supplies are installed, power supply failure has occurred, or the power button cable is disconnected.

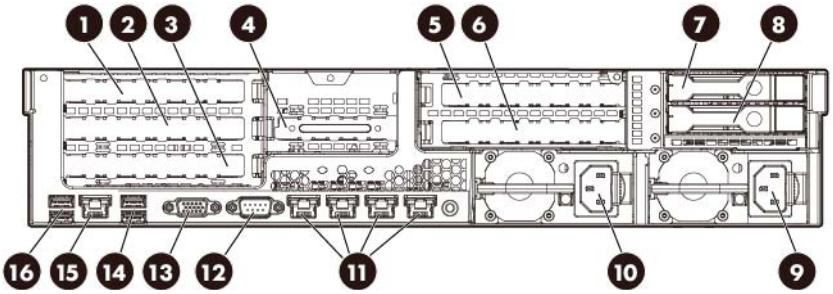
Rear panel components

- Rear panel without the secondary PCI riser cage and rear drive options



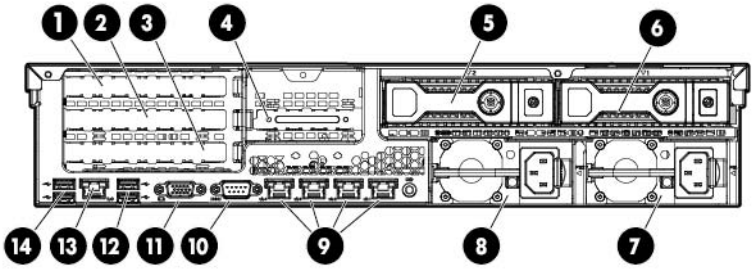
Item	Description
1	Riser board without SAS support: Slot 1 PCIe3 x8 (4, 1)* Riser board with SAS support: Slot 1 PCIe3 x16 (8, 4, 1)*
2	Slot 2 PCIe3 x16 (8, 4, 1)*
3	Only for riser board without SAS support: Slot 3 PCIe3 x8 (8, 4, 1)*
4	Slot 4 PCIe2 x8 (4, 1)*
5	LFF drive blank
6	Power supply 1
7	Power supply 2 (optional)
8	NIC connectors (4-1)
9	Serial connector
10	Video connector
11	USB 2.0 connectors
12	iLO 4 connector

- Rear panel with the secondary PCI riser cage and 2 SFF rear drive options



Item	Description
1	Riser board without SAS support: Slot 1 PCIe3 x8 (4, 1)* Riser board with SAS support: Slot 1 PCIe3 x16 (8, 4, 1)*
2	Slot 2 PCIe3 x16 (8, 4, 1)*
3	Only for riser board without SAS support: Slot 3 PCIe3 x8 (8, 4, 1)*
4	Slot 4 PCIe2 x8 (4, 1)*
5	Slot 5 PCIe3 x16 (16, 8, 4, 1) (optional)*
6	Slot 6 PCIe3 x16 (8, 4, 1) (optional)*
7	Rear SFF drive 1 (optional)
8	Rear SFF drive 2 (optional)
9	Power supply 1
10	Power supply 2 (optional)
11	NIC connectors (4-1)
12	Serial connector
13	Video connector
14	USB 2.0 connectors
15	iLO 4 connector
16	USB 2.0 connectors

- Rear panel with the 2 LFF rear drive option

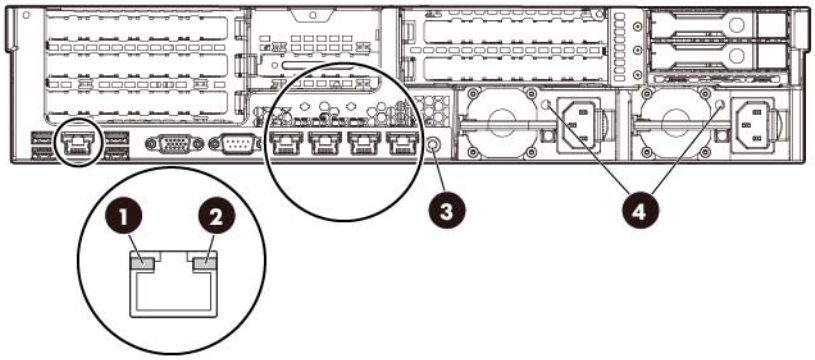


Item	Description
1	Riser board without SAS support: Slot 1 PCIe3 x8 (4, 1)* Riser board with SAS support: Slot 1 PCIe3 x16 (8, 4, 1)*
2	Slot 2 PCIe3 x16 (8, 4, 1)*
3	Only for riser board without SAS support: Slot 3 PCIe3 x8 (8, 4, 1)*
4	Slot 4 PCIe2 x8 (4, 1)*

Item	Description
5	Rear LFF drive 1 (optional)
6	Rear LFF drive 2 (optional)
7	Power supply 1
8	Power supply 2 (optional)
9	NIC connectors (4-1)
10	Serial connector
11	Video connector
12	USB 2.0 connectors
13	iLO 4 connector

* For more information on the riser board slots supported by the onboard PCI riser connectors, see "PCIe riser board slot definitions (on page 12)."

Rear panel LEDs and buttons



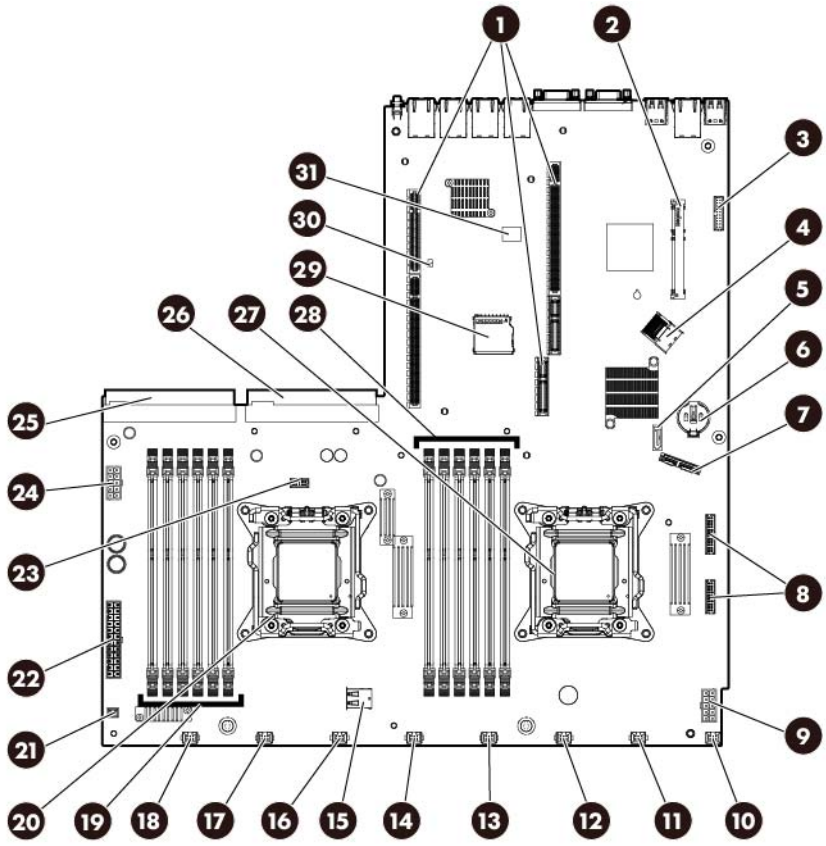
Item	Description	Status
1	NIC status LED	Solid green = Link to network Flashing green (1 Hz/cycle per sec) = Network active Off = No network activity
2	NIC link LED	Solid green = Link exists Off = No link exists
3	UID button/LED	Solid blue = Activated Flashing blue (1 Hz/cycle per sec) = Remote management or firmware upgrade in progress Off = Deactivated
4	Power supply LED	Solid green = Normal Off = One or more of the following conditions exists: • Power is unavailable • Power supply failed • Power supply is in standby mode • Power supply error

PCIe riser board slot definitions

Slot number	Riser board option	Type	Length	Height	Connector link width	Negotiable link width
1	Riser board without SAS support	PCIe3	Full	Full	x8	x4
	Riser board with SAS support	PCIe3	Full	Full	x16	x8
2	Riser board options with and without SAS support	PCIe3	Half	Full	x16	x8
3	Riser board without SAS support	PCIe3	Half	Full	x8	x8
4	Low-profile riser board	PCIe2	Half	Half	x8	x4
5	PCIe x16 riser board*	PCIe3	Full	Full	x16	x16
6	PCIe x16 riser board*	PCIe3	Half	Full	x16	x8

* Ships with the secondary PCI riser cage option

System board components



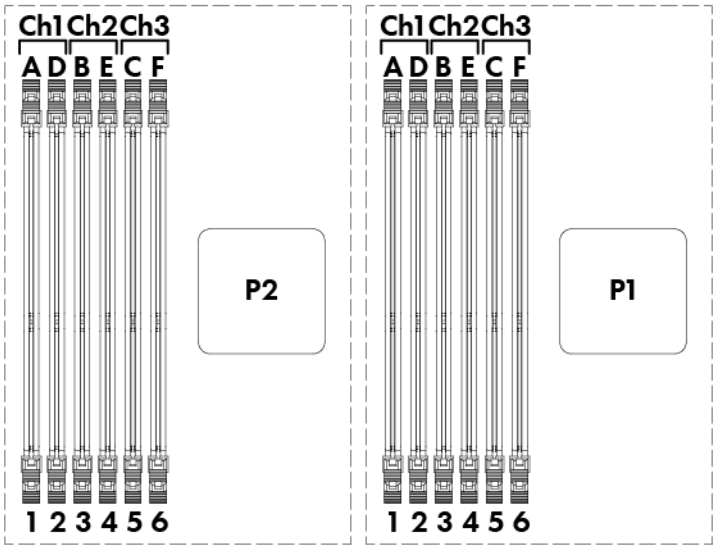
Item	Description
1	PCI riser connectors*
2	Cache module connector

Item	Description
3	TPM connector
4	Mini-SAS connector
5	SATA drive connector
6	System battery
7	SATA optical/storage drive connector
8	Front panel connectors
9	Primary GPU power connector
10	Reserved
11	Fan connector 6
12	Fan connector 5
13	Fan connector 4
14	Reserved
15	Internal USB connector
16	Fan connector 3
17	Fan connector 2
18	Fan connector 1
19	Processor 2 DIMM slots
20	Processor socket 2
21	Discovery service connector
22	Drive backplane power connector
23	Drive sideband signal connector
24	Secondary GPU power connector
25	Power supply connector 1
26	Power supply connector 2
27	Processor socket 1
28	Processor 1 DIMM slots
29	SD card slot
30	NMI header
31	System maintenance switch

* For more information on the riser board slots supported by the onboard PCI riser connectors, see "PCIe riser board slot definitions (on page 12)."

DIMM slot locations

DIMM slots are numbered sequentially (1 through 6) for each processor. The supported AMP modes use the letter assignments for population guidelines.



System maintenance switch

Switch	Default	Function
1	Off	Off = No function On = iLO 4 security is disabled
2	Off	Off = System configuration can be changed On = System configuration is locked
5	Off	Off = Power-on password is enabled On = Power-on password is disabled
6	Off	Off = No function On = ROM reads configuration as invalid
3, 4, 7, 8, 9, 10, 11, 12	—	Reserved

When the system maintenance switch position 6 is set to the On position, the system is prepared to erase all system configuration settings from both CMOS and NVRAM.

△ **CAUTION:** Clearing CMOS and/or NVRAM deletes configuration information. Be sure to properly configure the server or data loss could occur.

NMI functionality

An NMI crash dump creates a crash dump log before resetting a system which is not responding.

Crash dump log analysis is an essential part of diagnosing reliability problems, such as failures of operating systems, device drivers, and applications. Many crashes freeze a system, and the only available action for

administrators is to restart the system. Resetting the system erases any information which could support problem analysis, but the NMI feature preserves that information by performing a memory dump before a system reset.

To force the system to invoke the NMI handler and generate a crash dump log, do one of the following:

- Use the iLO Virtual NMI feature.
- Short the NMI header ("System board components" on page 12).

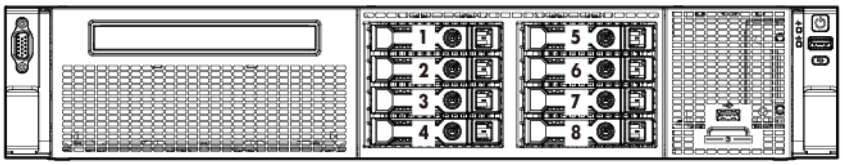
For more information, see the HP website (http://www.hp.com/support/NMI).

Drive numbering

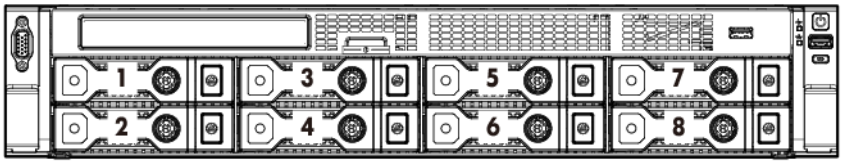
In an 8-bay drive cage, when only one SATA cable is connected, the server can only support a 4-drive configuration. In this configuration, drive bays 1 through 4 are populated, while drive bays 5 through 8 have drive blanks.

When the two-port SATA cable option ("Two-port SATA cable option" on page 44) is connected, the server supports a 6-drive configuration. In this configuration, drive bays 1 through 6 are populated, while drive bays 7 and 8 have drive blanks.

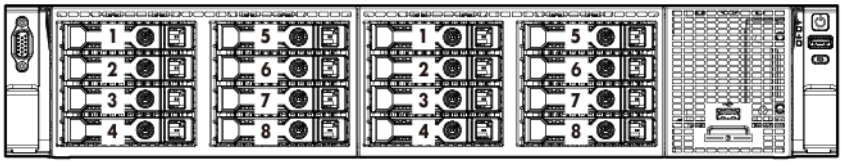
- 8-bay SFF drive model



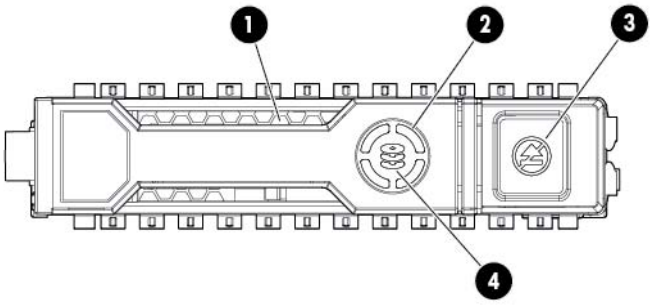
- 8-bay LFF drive model



- 8+8-bay SFF drive model



Drive LED definitions



Item	LED	Status	Definition
1	Locate	Solid blue	The drive is being identified by a host application.
		Flashing blue	The drive carrier firmware is being updated or requires an update.
2	Activity ring	Rotating green	Drive activity
		Off	No drive activity
3	Do not remove	Solid white	Do not remove the drive. Removing the drive causes one or more of the logical drives to fail.
		Off	Removing the drive does not cause a logical drive to fail.
4	Drive status	Solid green	The drive is a member of one or more logical drives.
		Flashing green	The drive is rebuilding or performing a RAID migration, stripe size migration, capacity expansion, or logical drive extension, or is erasing.
		Flashing amber/green	The drive is a member of one or more logical drives and predicts the drive will fail.
		Flashing amber	The drive is not configured and predicts the drive will fail.
		Solid amber	The drive has failed.
		Off	The drive is not configured by a RAID controller.

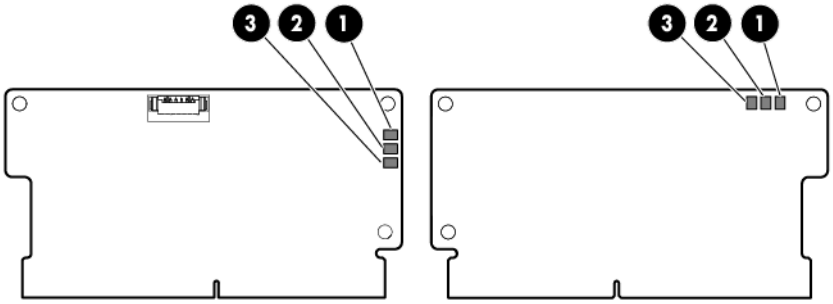
IMPORTANT: When the SAS-enabled riser board with the Smart Array B320i Controller is installed in the server, the embedded Smart Array B120i Controller is disabled automatically. When this condition occurs:

- Drives connected to the system board operate in AHCI or Legacy mode.
- In AHCI or Legacy mode, drives cannot be a part of a hardware RAID or a logical drive.
- The Locate, Drive status, and Do not remove LEDs of the affected drives are disabled.

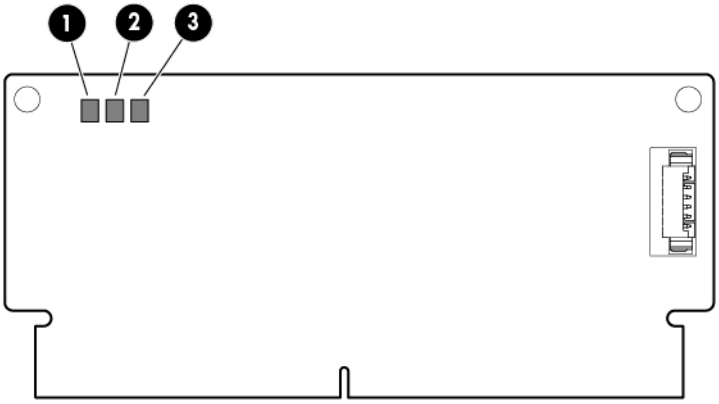
FBWC module LED definitions

The FBWC module has three single-color LEDs (one amber and two green). The LEDs on the cache module installed on a storage controller are duplicated on the reverse side of the module to facilitate status viewing.

- Cache module installed on a storage controller



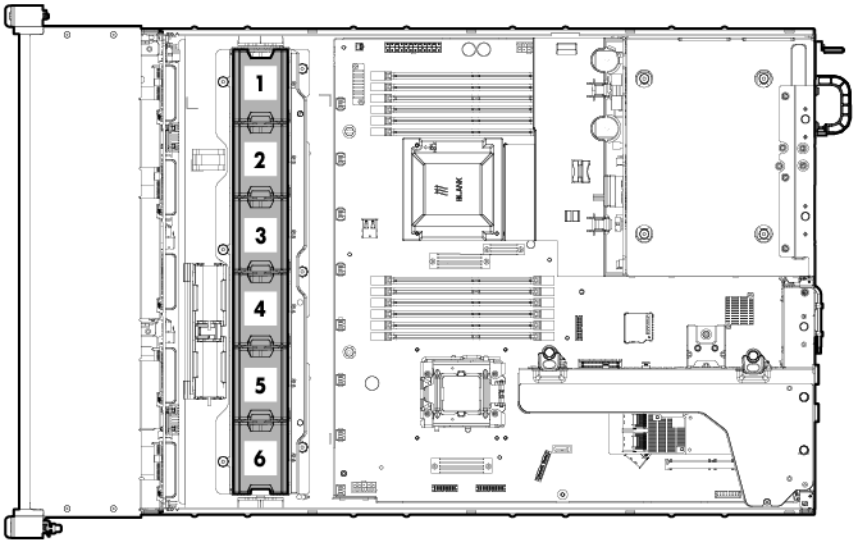
- Cache module installed on the system board



1 - Amber	2 - Green	3 - Green	Interpretation
Off	Off	Off	The cache module is not powered.
Off	Flashing 0.5 Hz	Flashing 0.5 Hz	The cache microcontroller is executing from within its boot loader and receiving new flash code from the host controller.
Off	Flashing 1 Hz	Flashing 1 Hz	The cache module is powering up, and the capacitor pack is charging.
Off	Off	Flashing 1 Hz	The cache module is idle, and the capacitor pack is charging.
Off	Off	On	The cache module is idle, and the capacitor pack is charged.
Off	On	On	The cache module is idle, the capacitor pack is charged, and the cache contains data that has not yet been written to the drives.
Off	Flashing 1 Hz	Off	A backup is in progress.
Off	On	Off	The current backup is complete with no errors.
Flashing 1 Hz	Flashing 1 Hz	Off	The current backup failed, and data has been lost.
Flashing 1 Hz	Flashing 1 Hz	On	A power error occurred during the previous or current boot. Data might be corrupt.
Flashing 1 Hz	On	Off	An overtemperature condition exists.

1 - Amber	2 - Green	3 - Green	Interpretation
Flashing 2 Hz	Flashing 2 Hz	Off	The capacitor pack is not attached.
Flashing 2 Hz	Flashing 2 Hz	On	The capacitor has been charging for 10 minutes, but has not reached sufficient charge to perform a full backup.
On	On	Off	The current backup is complete, but power fluctuations occurred during the backup.
On	On	On	The cache module microcontroller has failed.

Fan locations



Operations

Power up the server

1. Connect each power cord to the server.
2. Connect each power cord to the power source.
3. Press the Power On/Standby button.

   The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.

Power down the server

Before powering down the server for any upgrade or maintenance procedures, perform a backup of critical server data and programs.

WARNING: To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC/DC power is removed.

IMPORTANT: When the server is in standby mode, auxiliary power is still being provided to the system.

To power down the server, use one of the following methods:

- Press and release the Power On/Standby button.

  This method initiates a controlled shutdown of applications and the OS before the server enters standby mode.
- Press and hold the Power On/Standby button for more than 4 seconds to force the server to enter standby mode.

  This method forces the server to enter standby mode without properly exiting applications and the OS. If an application stops responding, you can use this method to force a shutdown.
- Use a virtual power button selection through iLO 4.

  This method initiates a controlled remote shutdown of applications and the OS before the server enters standby mode.

Before proceeding, verify the server is in standby mode by observing that the system power LED is amber.

Extend the server from the rack

IMPORTANT: The requirement of extending or removing the server from the rack when performing installation and maintenance procedures depends on the rail system used:

- If using a ball-bearing rail system, you can perform most installations and maintenance by simply extending the server from the rack.
- If using a friction rail system, to perform installations or maintenance that requires access panel removal, remove the server from the rack.

To extend the server from an HP, Compaq-branded, Telco, or third-party rack:

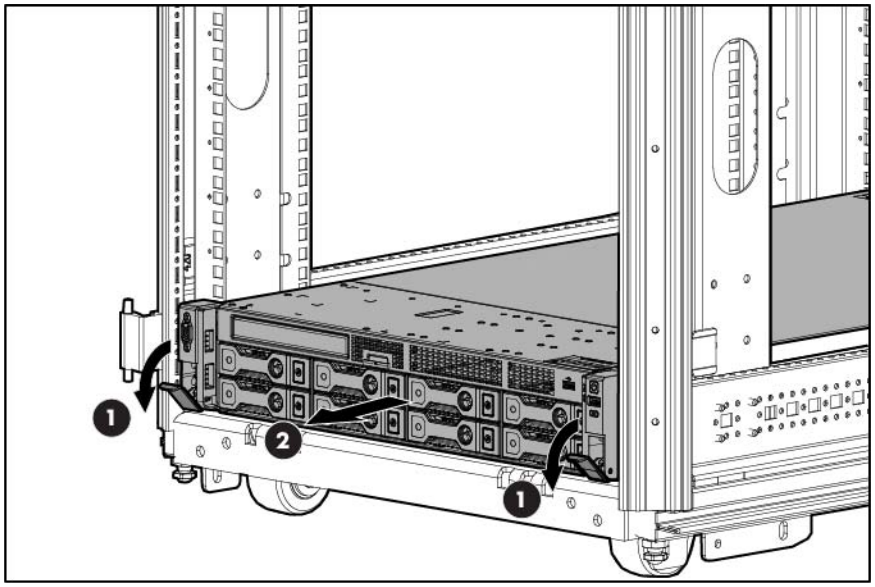
1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Disconnect all peripheral cables.

WARNING: To reduce the risk of personal injury or equipment damage, be sure that the rack is adequately stabilized before extending a component from the rack.

WARNING: To reduce the risk of personal injury, be careful when pressing the server rail-release latches and sliding the server into the rack. The sliding rails could pinch your fingers.

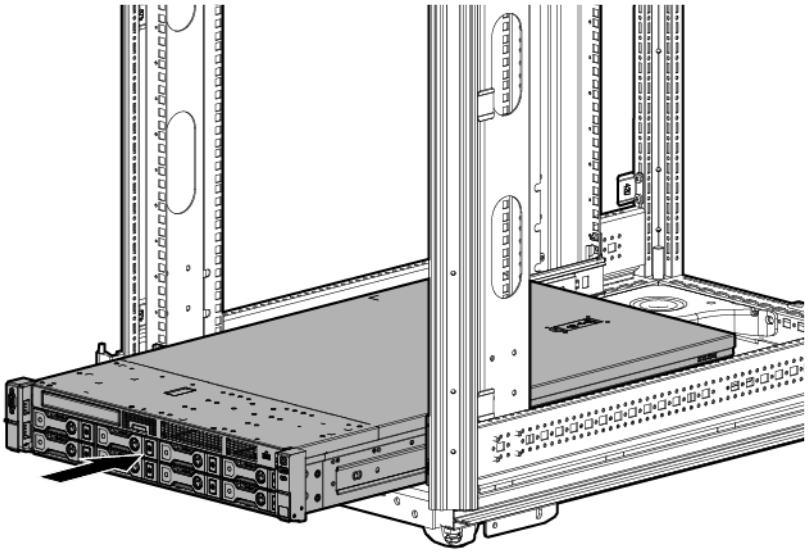
4. Pull down the quick release levers on each side of the server.
5. Extend the server on the rack rails until the server rail-release latches engage.

   If the server does not extend from the rack, use a T-25 Torx screwdriver to loosen the screws located within the lever housing.



6. After performing the installation or maintenance procedure, slide the server into the rack.

For more information, see the documentation that ships with the rack mounting option.



7. Connect the peripheral cables.
8. Connect each power cord to the server.
9. Connect each power cord to the power source.

Remove the server from the rack

WARNING: This server is very heavy. To reduce the risk of personal injury or damage to the equipment:

- Observe local occupational health and safety requirements and guidelines for manual material handling.
- Get help to lift and stabilize the product during installation or removal, especially when the product is not fastened to the rails. HP recommends that a minimum of two people are required for all rack server installations. A third person may be required to help align the server if the server is installed higher than chest level.
- Use caution when installing the server in or removing the server from the rack; it is unstable when not fastened to the rails.

IMPORTANT: The requirement of extending or removing the server from the rack when performing installation and maintenance procedures depends on the rail system used:

- If using a ball-bearing rail system, you can perform most installations and maintenance by simply extending the server from the rack.
- If using a friction rail system, to perform installations or maintenance that requires access panel removal, remove the server from the rack.

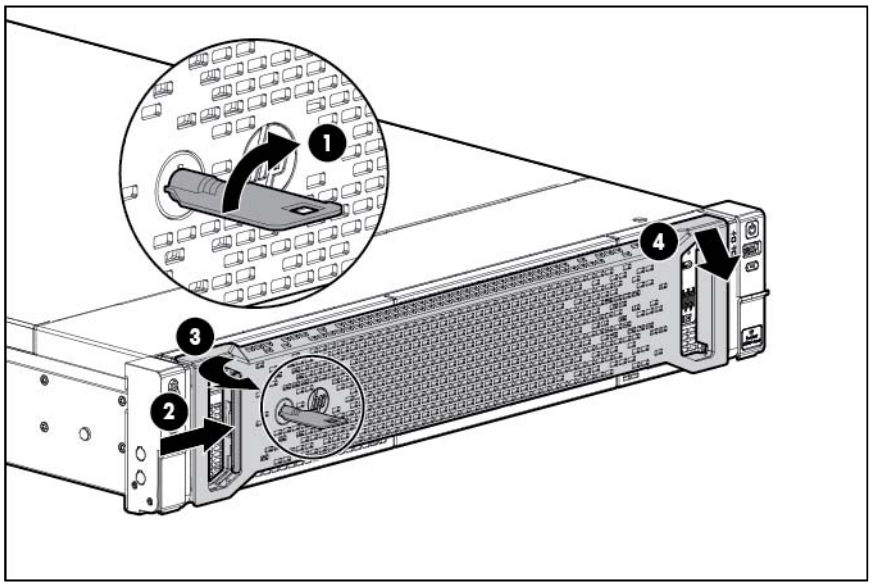
To remove the server from an HP, Compaq-branded, Telco, or third-party rack:

1. Power down the server (on page 19).
2. Disconnect all peripheral cables and power cords from the server rear panel.
3. Extend the server from the rack (on page 19).
4. Remove the server from the rack. For more information, see the documentation that ships with the rack mounting option.

5. Place the server on a sturdy, level surface.

Remove the security bezel (optional)

To access the front panel components, unlock and then remove the security bezel.



Remove the access panel

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

△ **CAUTION:** Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   - Extend the server from the rack (on page 19).
   - Remove the server from the rack (on page 21).
4. Open the access panel latch, slide the access panel to the rear of the chassis, and then remove the access panel.

   If the access panel latch is locked, use a T-15 Torx screwdriver to unlock the latch.

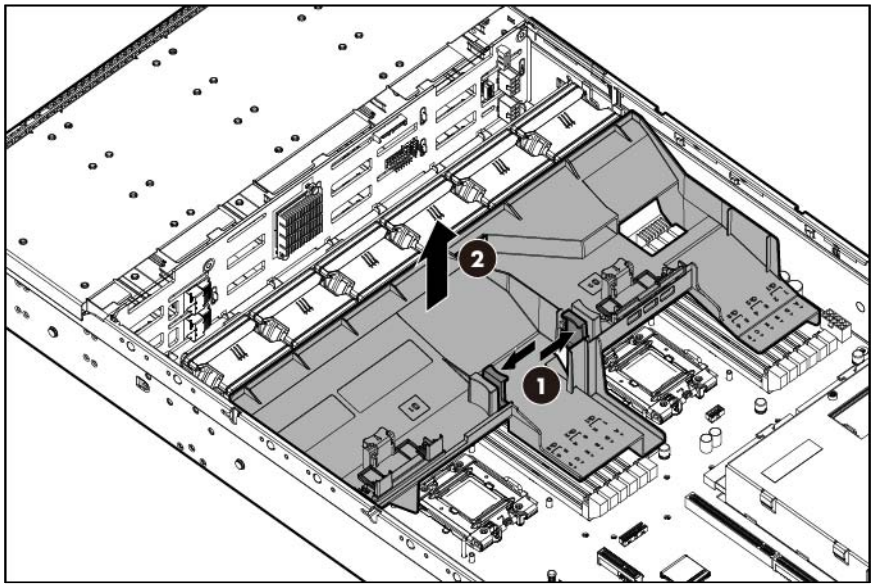
Install the access panel

1. Place the access panel on top of the server with the access panel latch open. Allow the panel to extend past the rear of the server by approximately 1.25 cm (0.5 inch).
2. Close the access panel latch. The access panel slides to a closed position.
3. Use a T-15 Torx screwdriver to tighten the access panel latch screw.

Remove the air baffle

CAUTION: For proper cooling, do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

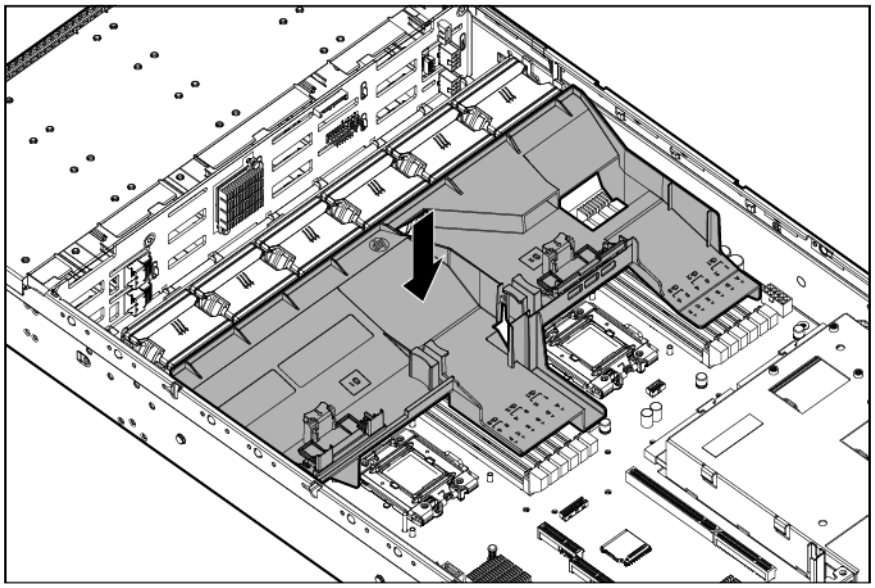
1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   - Extend the server from the rack (on page 19).
   - Remove the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Press and hold the release latches, and then remove the air baffle.



Install the air baffle

CAUTION: For proper cooling, do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

1. Install the air baffle.



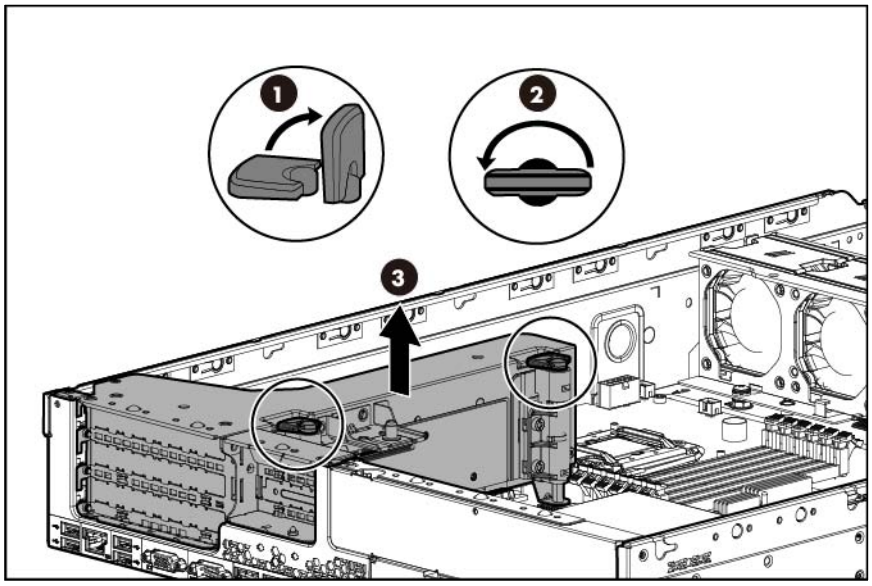
2. Install the access panel (on page 23).
3. Install the server into the rack ("Installing the server into the rack" on page 32).
4. Power up the server (on page 19).

Remove the PCI riser cages

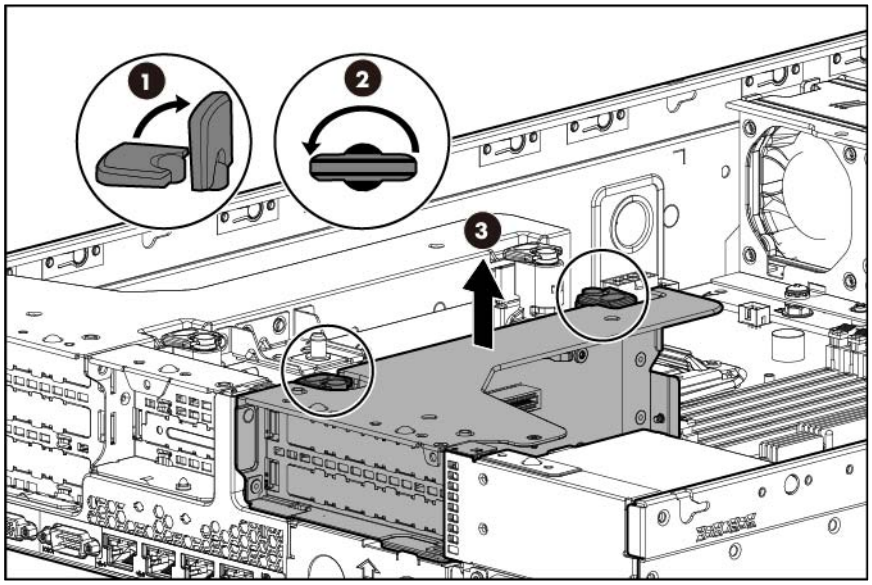
CAUTION: To prevent damage to the server or expansion boards, power down the server, and disconnect all power cords before removing or installing the PCI riser cage.

1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   - Extend the server from the rack (on page 19).
   - Remove the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Disconnect all cables connected to the expansion board.
6. Lift the release tabs, and then rotate them 180° counterclockwise.
7. Lift the PCI riser cage to unseat the PCI riser boards.

- Primary PCI riser cage



- Secondary PCI riser cage (optional)

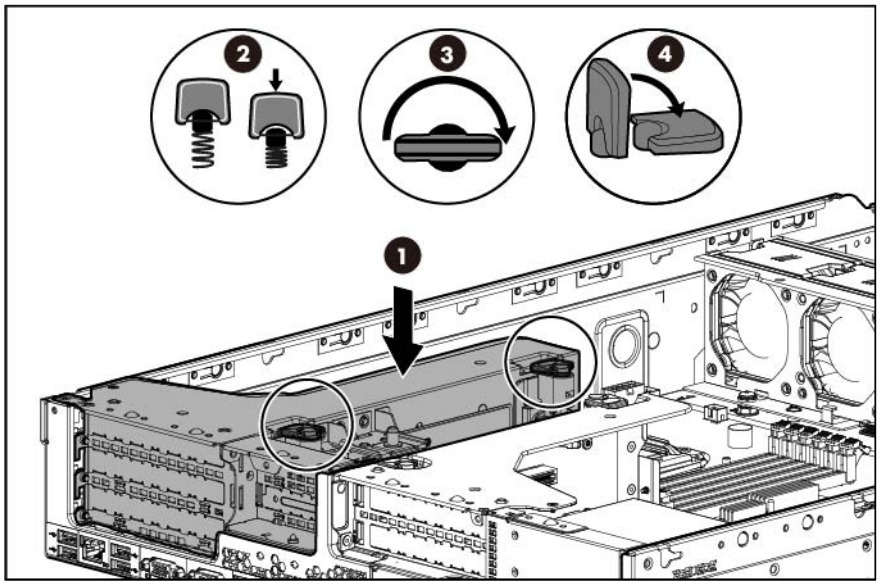


Install the PCI riser cages

△ **CAUTION:** To prevent damage to the server or expansion boards, power down the server, and disconnect all power cords before removing or installing the PCI riser cage.

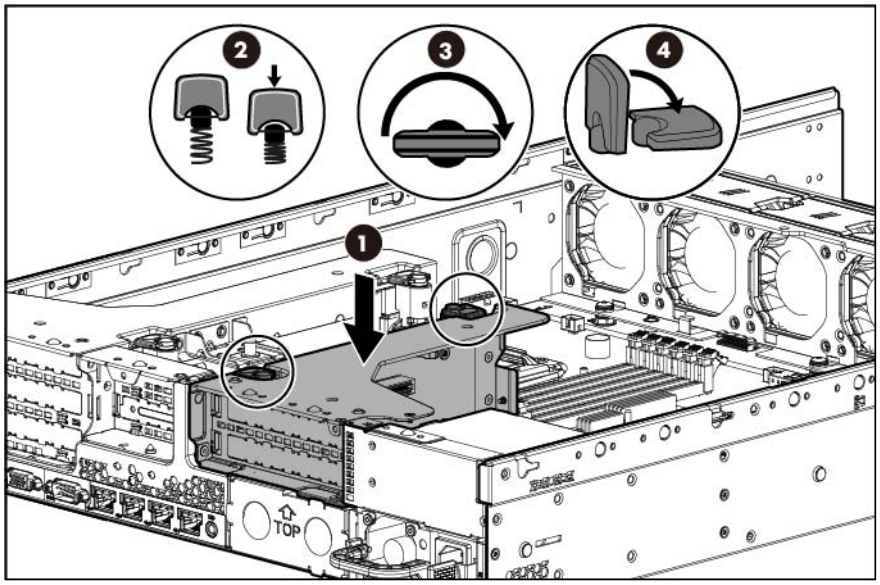
1. Align the PCI riser board with the corresponding connector on the system board, and then press down the riser cage.
2. Push down the release tabs, and then rotate them 180° clockwise.

- Primary PCI riser cage



- Secondary PCI riser cage (optional)

  The secondary PCI riser cage (PN 688037-001) is optional in a dual-processor configuration. If the rear SFF drive cage option is not installed, install the rear SFF drive cage blank.



3. Connect all necessary external cabling to the expansion board. For more information on these cabling requirements, see the documentation that ships with the option.
4. Install the access panel (on page 23).
5. Install the server into the rack ("Installing the server into the rack" on page 32).
6. Power up the server (on page 19).

Setup

Optional installation services

Delivered by experienced, certified engineers, HP Care Pack services help you keep your servers up and running with support packages tailored specifically for HP ProLiant systems. HP Care Packs let you integrate both hardware and software support into a single package. A number of service level options are available to meet your needs.

HP Care Pack Services offer upgraded service levels to expand your standard product warranty with easy-to-buy, easy-to-use support packages that help you make the most of your server investments. Some of the Care Pack services are:

- Hardware support
  - 6-Hour Call-to-Repair
  - 4-Hour 24x7 Same Day
  - 4-Hour Same Business Day
- Software support
  - Microsoft®
  - Linux
  - HP ProLiant Essentials (HP SIM and RDP)
  - VMware
- Integrated hardware and software support
  - Critical Service
  - Proactive 24
  - Support Plus
  - Support Plus 24
- Startup and implementation services for both hardware and software

For more information on HP Care Pack Services, see the HP website (http://www.hp.com/services/carepack).

Optimum environment

When installing the server in a rack, select a location that meets the environmental standards described in this section.

Space and airflow requirements

To allow for servicing and adequate airflow, observe the following space and airflow requirements when deciding where to install a rack:

- Leave a minimum clearance of 63.5 cm (25 inches) in front of the rack.
- Leave a minimum clearance of 76.2 cm (30 inches) behind the rack.
- Leave a minimum clearance of 121.9 cm (48 inches) from the back of the rack to the back of another rack or row of racks.

HP servers draw in cool air through the front and expel warm air through the rear. Therefore, the front and rear rack doors must be adequately ventilated to allow ambient room air to enter the cabinet, and the rear door must be adequately ventilated to allow the warm air to escape from the cabinet.

CAUTION: To prevent improper cooling and damage to the equipment, do not block the ventilation openings.

When vertical space in the rack is not filled by a server or rack component, the gaps between the components might cause changes in airflow through the rack and across the servers. To maintain airflow cover all gaps with blanking panels.

CAUTION: Always use blanking panels to fill empty vertical spaces in the rack. This arrangement ensures proper airflow. Using a rack without blanking panels results in improper cooling that can lead to thermal damage.

The 9000 and 10000 series racks provide proper server cooling from flow-through perforations in the front and rear doors that provide 64% open area for ventilation.

CAUTION: When using a Compaq branded 7000 series rack, install the high airflow rack door insert (PN 327281-B21 for 42U rack, PN 157847-B21 for 22U rack) to provide proper front-to-back airflow and cooling.

CAUTION: If a third-party rack is used, observe the following additional requirements to ensure adequate airflow and to prevent damage to the equipment:

- Front and rear doors—If the 42U rack includes closing front and rear doors, you must allow 5,350 sq cm (830 sq in) of holes evenly distributed from top to bottom to permit adequate airflow (equivalent to the required 64 percent open area for ventilation).
- Side—The clearance between the installed rack component and the side panels of the rack must be a minimum of 7 cm (2.75 in).

Temperature requirements

To ensure continued safe and reliable equipment operation, install or position the system in a well-ventilated, climate-controlled environment.

The maximum recommended ambient operating temperature (TMRA) for most server products is 35°C (95°F). The temperature in the room where the rack is located must not exceed 35°C (95°F).

CAUTION: To reduce the risk of damage to the equipment when installing third-party options:

- Do not permit optional equipment to impede airflow around the server or to increase the internal rack temperature beyond the maximum allowable limits.
- Do not exceed the manufacturer's TMRA.

Power requirements

Installation of this equipment must comply with local and regional electrical regulations governing the installation of information technology equipment by licensed electricians. This equipment is designed to operate in installations covered by NFPA 70, 1999 Edition (National Electric Code) and NFPA-75, 1992 (code for Protection of Electronic Computer/Data Processing Equipment). For electrical power ratings on options, refer to the product rating label or the user documentation supplied with that option.

⚠ **WARNING:** To reduce the risk of personal injury, fire, or damage to the equipment, do not overload the AC supply branch circuit that provides power to the rack. Consult the electrical authority having jurisdiction over wiring and installation requirements of your facility.

⚠ **CAUTION:** Protect the server from power fluctuations and temporary interruptions with a regulating uninterruptible power supply. This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system in operation during a power failure.

When installing more than one server, you might need to use additional power distribution devices to safely provide power to all devices. Observe the following guidelines:

- Balance the server power load between available AC supply branch circuits.
- Do not allow the overall system AC current load to exceed 80% of the branch circuit AC current rating.
- Do not use common power outlet strips for this equipment.
- Provide a separate electrical circuit for the server.

For more information on the hot-plug power supply and calculators to determine server power consumption in various system configurations, see the HP Power Advisor website (http://www.hp.com/go/hppoweradvisor).

Electrical grounding requirements

The server must be grounded properly for proper operation and safety. In the United States, you must install the equipment in accordance with NFPA 70, 1999 Edition (National Electric Code), Article 250, as well as any local and regional building codes. In Canada, you must install the equipment in accordance with Canadian Standards Association, CSA C22.1, Canadian Electrical Code. In all other countries, you must install the equipment in accordance with any regional or national electrical wiring codes, such as the International Electrotechnical Commission (IEC) Code 364, parts 1 through 7. Furthermore, you must be sure that all power distribution devices used in the installation, such as branch wiring and receptacles, are listed or certified grounding-type devices.

Because of the high ground-leakage currents associated with multiple servers connected to the same power source, HP recommends the use of a PDU that is either permanently wired to the building's branch circuit or includes a nondetachable cord that is wired to an industrial-style plug. NEMA locking-style plugs or those complying with IEC 60309 are considered suitable for this purpose. Using common power outlet strips for the server is not recommended.

Connecting a DC power cable to a DC power source

WARNING: To reduce the risk of electric shock or energy hazards:

- This equipment must be installed by trained service personnel, as defined by the NEC and IEC 60950-1, Second Edition, the standard for Safety of Information Technology Equipment.
- Connect the equipment to a reliably grounded SELV source. An SELV source is a secondary circuit that is designed so normal and single fault conditions do not cause the voltages to exceed a safe level (60 V direct current).
- The branch circuit overcurrent protection must be rated 20A.

WARNING: When installing a DC power supply, the ground wire must be connected before the positive or negative leads.

WARNING: Remove power from the power supply before performing any installation steps or maintenance on the power supply.

CAUTION: The server equipment connects the earthed conductor of the DC supply circuit to the earthing conductor at the equipment. For more information, see the *HP 750W Common Slot -48V DC Input Hot-Plug Power Supply Kit Installation Instructions*.

CAUTION: If the DC connection exists between the earthed conductor of the DC supply circuit and the earthing conductor at the server equipment, the following conditions must be met:

- This equipment must be connected directly to the DC supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the DC supply system earthing electrode conductor is connected.
- This equipment should be located in the same immediate area (such as adjacent cabinets) as any other equipment that has a connection between the earthed conductor of the same DC supply circuit and the earthing conductor, and also the point of earthing of the DC system. The DC system should be earthed elsewhere.
- The DC supply source is to be located within the same premises as the equipment.
- Switching or disconnecting devices should not be in the earthed circuit conductor between the DC source and the point of connection of the earthing electrode conductor.

To connect a DC power cable to a DC power source:

1. Cut the DC power cord ends no shorter than 150 cm (59.06 in).
2. If the power source requires ring tongues, use a crimping tool to install the ring tongues on the power cord wires.

IMPORTANT: The ring tongues must be UL approved and accommodate 12 gauge wires.

IMPORTANT: The minimum nominal thread diameter of a pillar or stud type terminal must be 3.5 mm (0.138 in); the diameter of a screw type terminal must be 4.0 mm (0.157 in).

3. Stack each same-colored pair of wires and then attach them to the same power source. The power cord consists of three wires (black, red, and green).

For more information, see the *HP 750W Common Slot -48V DC Input Hot-Plug Power Supply Installation Instructions*.

Server warnings and cautions

⚠ **WARNING:** This server is very heavy. To reduce the risk of personal injury or damage to the equipment:

- Observe local occupational health and safety requirements and guidelines for manual material handling.
- Get help to lift and stabilize the product during installation or removal, especially when the product is not fastened to the rails. HP recommends that a minimum of two people are required for all rack server installations. A third person may be required to help align the server if the server is installed higher than chest level.
- Use caution when installing the server in or removing the server from the rack; it is unstable when not fastened to the rails.

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠ **WARNING:** To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC/DC power is removed.

⚠ **CAUTION:** Protect the server from power fluctuations and temporary interruptions with a regulating uninterruptible power supply. This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system in operation during a power failure.

⚠ **CAUTION:** Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

Rack warnings

⚠ **WARNING:** To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- The stabilizing feet are attached to the rack if it is a single-rack installation.
- The racks are coupled together in multiple-rack installations.
- Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.

⚠ **WARNING:** To reduce the risk of personal injury or equipment damage when unloading a rack:

- At least two people are needed to safely unload the rack from the pallet. An empty 42U rack can weigh as much as 115 kg (253 lb), can stand more than 2.1 m (7 ft) tall, and might become unstable when being moved on its casters.
- Never stand in front of the rack when it is rolling down the ramp from the pallet. Always handle the rack from both sides.

⚠ **WARNING:** To reduce the risk of personal injury or damage to the equipment, adequately stabilize the rack before extending a component outside the rack. Extend only one component at a time. A rack may become unstable if more than one component is extended.

⚠ **WARNING:** When installing a server in a telco rack, be sure that the rack frame is adequately secured at the top and bottom to the building structure.

Identifying the contents of the server shipping carton

Unpack the server shipping carton and locate the materials and documentation necessary for installing the server. All the rack mounting hardware necessary for installing the server into the rack is included with the rack or the server.

The contents of the server shipping carton include:

- Server
- Power cord
- Printed setup documentation, Documentation CD, and software products
- Rack mounting hardware kit and documentation (optional)

You need the following items for some procedures:

- T-25 Torx screwdriver (to use on the screws located inside the server quick-release levers)
- T-10/T-15 Torx screwdriver
- Hardware options
- Operating system or application software

Installing hardware options

Install any hardware options before initializing the server. For options installation information, see the option documentation. For server-specific information, see "Hardware options installation (on page 35)."

Installing the server into the rack

To install the server into a rack with square, round, or threaded holes, refer to the instructions that ship with the rack hardware kit.

If you are installing the server into a telco rack, order the appropriate option kit at the RackSolutions.com website (http://www.racksolutions.com/hp). Follow the server-specific instructions on the website to install the rack brackets.

⚠ **WARNING:** This server is very heavy. To reduce the risk of personal injury or damage to the equipment:

- Observe local occupational health and safety requirements and guidelines for manual material handling.
- Get help to lift and stabilize the product during installation or removal, especially when the product is not fastened to the rails. HP recommends that a minimum of two people are required for all rack server installations. A third person may be required to help align the server if the server is installed higher than chest level.
- Use caution when installing the server in or removing the server from the rack; it is unstable when not fastened to the rails.

CAUTION: Always plan the rack installation so that the heaviest item is on the bottom of the rack. Install the heaviest item first, and continue to populate the rack from the bottom to the top.

To install the server in an HP, Compaq-branded, Telco, or a third-party rack:

1. Install the server and cable management arm option into the rack. See the documentation that ships with the Quick Deploy Rail System.
2. Connect peripheral devices to the server. For information on identifying connectors, see "Rear panel components (on page 9)."

WARNING: To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into RJ-45 connectors.

3. Connect the power cord to the server.
4. Connect the power cord to the power source.

WARNING: To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
- Unplug the power cord from the power supply to disconnect power to the equipment.
- Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the server.

Powering on and selecting boot options

1. Connect the Ethernet cable.
2. Press the Power On/Standby button.
3. During the initial boot:
   - To modify the server configuration ROM default settings, press **F9** when prompted from the start up sequence to enter the RBSU. By default, RBSU runs in the English language.
   - If you do not need to modify the server configuration and are ready to install the system software, press **F10** to access Intelligent Provisioning.

NOTE: If an HP Smart Array controller has been added or is embedded in the system, the controller defaults to a RAID configuration based on the size and number of drives installed. For more information on modifying the controller default settings, see the documentation on the Documentation CD.

For more information on automatic configuration, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the iLO Management Engine Information Library (http://www.hp.com/support/rbsu).

Installing the operating system

This HP ProLiant server does not ship with provisioning media. Everything needed to manage and install the system software and firmware is preloaded on the server.

To operate properly, the server must have a supported operating system. For the latest information on operating system support, see the HP website (http://www.hp.com/go/supportos).

To install an operating system on the server, use one of the following methods:

- Intelligent Provisioning—The iLO Management Engine is a new feature on ProLiant servers that contains Intelligent Provisioning for embedded deployment, updating, and provisioning capabilities. Intelligent Provisioning can configure the server and install an operating system, eliminating the need for SmartStart CDs and Smart Update Firmware DVDs.

  To install an operating system on the server with Intelligent Provisioning (local or remote):

  a. Connect the Ethernet cable between the network connector on the server and a network jack.
  b. Press the Power On/Standby button.
  c. During server POST, press the **F10** key.
  d. Complete the initial Preferences and Registration portion of Intelligent Provisioning (on page 99).
  e. At the 1 Start screen, click the **Configure and Install** button.
  f. To finish the installation, follow the onscreen prompts. An Internet connection is required to update the firmware and systems software.

- Remote deployment installation—To deploy an operating system remotely, use Insight Control server deployment for an automated solution.

For additional system software and firmware updates, download the HP Service Pack for ProLiant from the HP website (http://www.hp.com/go/spp/download). Software and firmware must be updated before using the server for the first time, unless any installed software or components require an older version. For more information, see "Keeping the system current (on page 107)."

For more information on using these installation methods, see the HP website (http://www.hp.com/go/ilo).

Registering the server

To experience quicker service and more efficient support, register the product at the HP Product Registration website (http://register.hp.com).

Hardware options installation

Introduction

If more than one option is being installed, read the installation instructions for all the hardware options and identify similar steps to streamline the installation process.

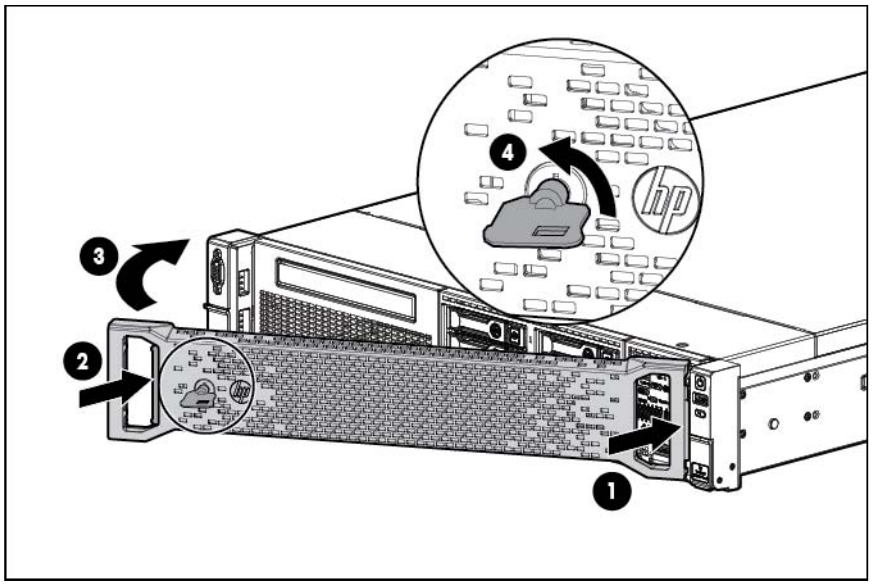
⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

⚠ **CAUTION:** To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause electrostatic discharge.

Security bezel option

The security bezel helps prevent unauthorized physical access to the front panel components.

Install the security bezel, and then lock it with the key provided with the kit.



Drive options

For a list of drive configurations supported in this server, see "Drive numbering (on page 15)." For additional drive capacity, install a rear LFF or SFF drive cage ("Rear drive cage options" on page 37).

The embedded storage controller supports SATA drive installation.

For SAS drive installation, do one of the following:

- Install the riser board option with the embedded HP Dynamic Smart Array B320i controller (PN 684896-001).

  The HP Dynamic Smart Array B320i controller embedded in this riser board option requires an HP Smart Array SAS License Key to support SAS drives. For information on obtaining a license key, see the HP website (http://www.hp.com/go/saslicense). To activate the license key, use HP SSA ("HP Smart Storage Administrator" on page 105). For detailed instructions on how to activate the license key, see the *HP Smart Storage Administrator User Guide* on the HP website (http://www.hp.com/go/smartstorage/docs).

  IMPORTANT: The boot order settings, firmware versions, and any additional HP software, including the HP Smart Array SAS license key, are stored in the system board. Transfer this information to the new system board to ensure normal server operation when the system board is replaced.

- Install an integrated HP Smart Array controller option ("Installing a storage controller" on page 48). SAS functionality is enabled automatically in the controller board.

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

Drive installation guidelines

When adding drives to the server, observe the following general guidelines:

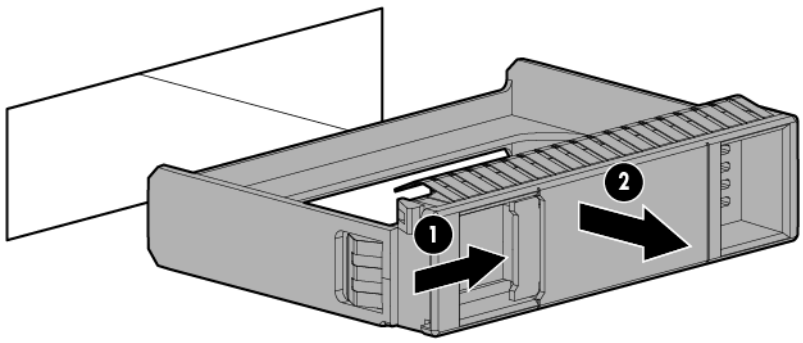
- The system automatically sets all device numbers.
- Populate drive bays, based on the drive numbering sequence. Start from the drive bay with the lowest device number ("Drive numbering" on page 15).
- When drives are grouped together into the same drive array, they must be of the same capacity to provide the greatest storage space efficiency.

Installing a hot-plug drive

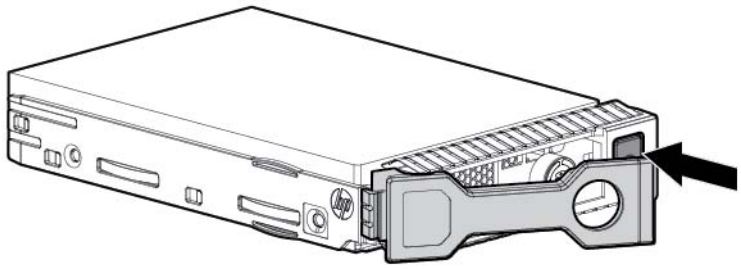
CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

To install the component:

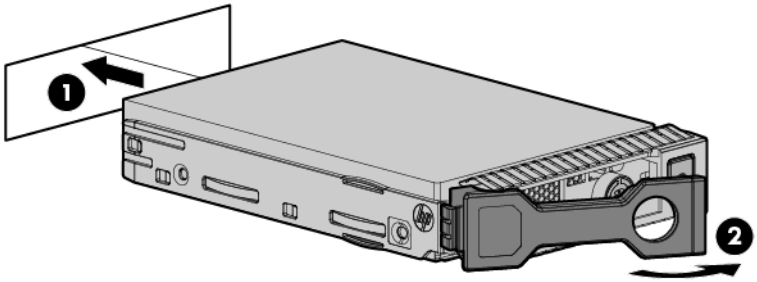
1. Remove the drive blank.



2. Prepare the drive.



3. Install the drive.



4. Determine the status of the drive from the drive LED definitions (on page 16).

To configure arrays, see the *HP Smart Storage Administrator User Guide* on the HP website (http://www.hp.com/go/smartstorage/docs).

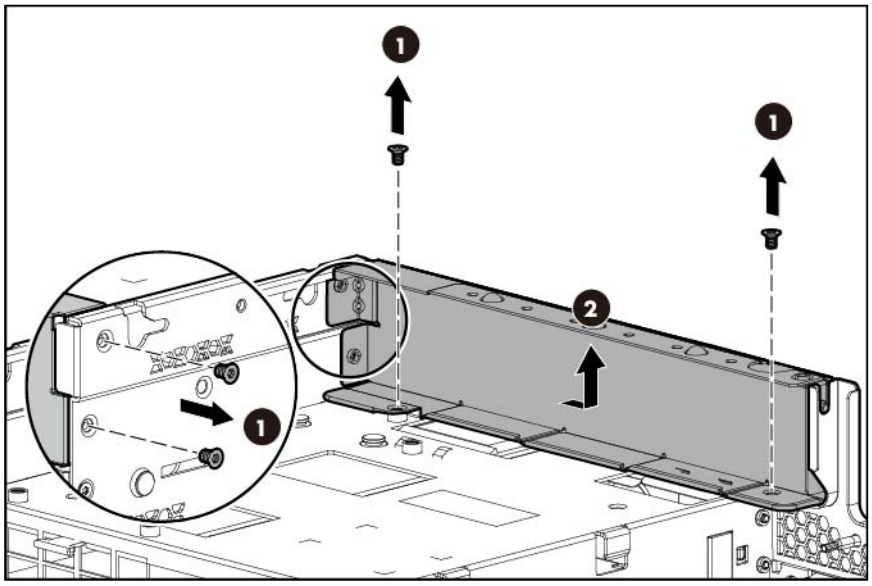
Rear drive cage options

The server supports a two-bay LFF or SFF rear drive cage option. When a rear drive cage option is installed, the optical drive is disabled.

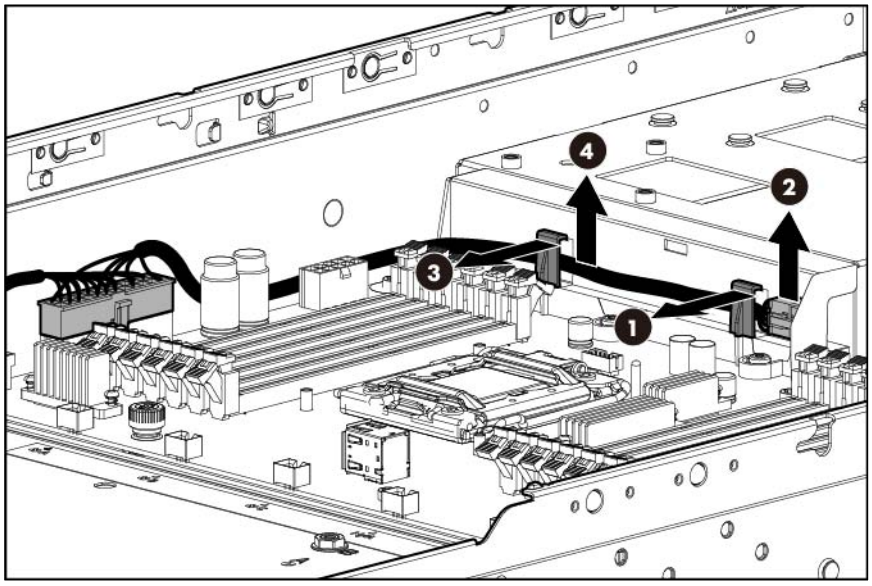
Installing a 2 LFF rear drive cage option

1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   - Extend the server from the rack (on page 19).
   - Remove the server from the rack (on page 21).
4. Remove the access panel (on page 22).

5. Remove the LFF drive cage blank.

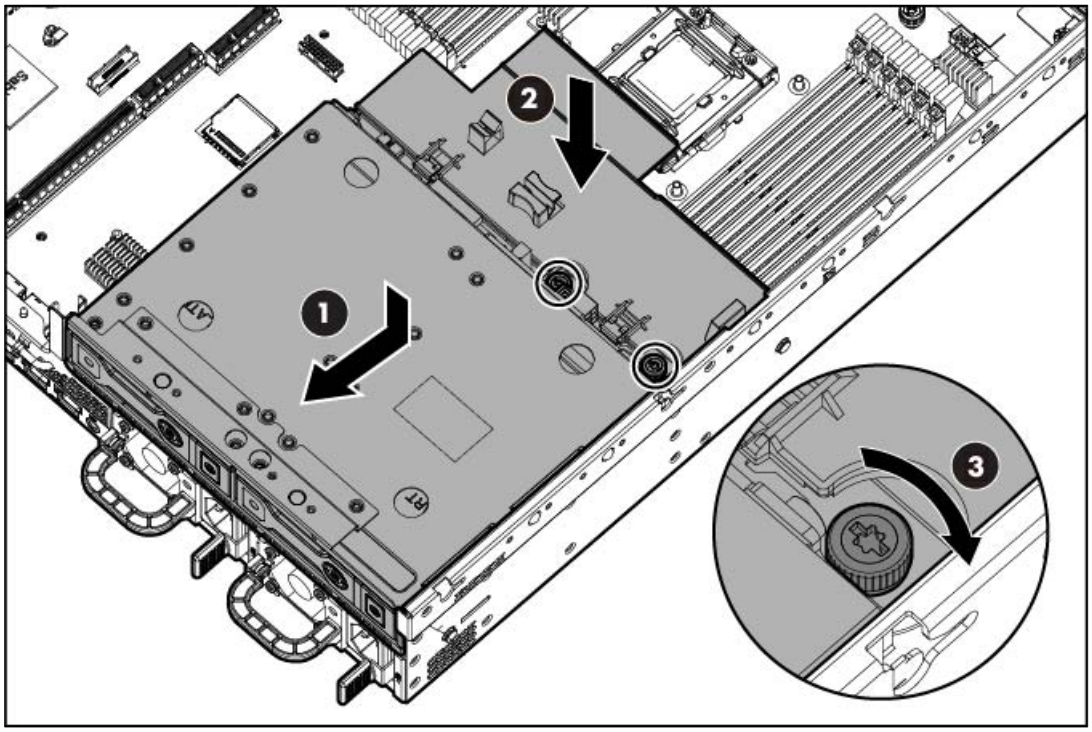


6. Release the drive power cable from the PSU air baffle latches.

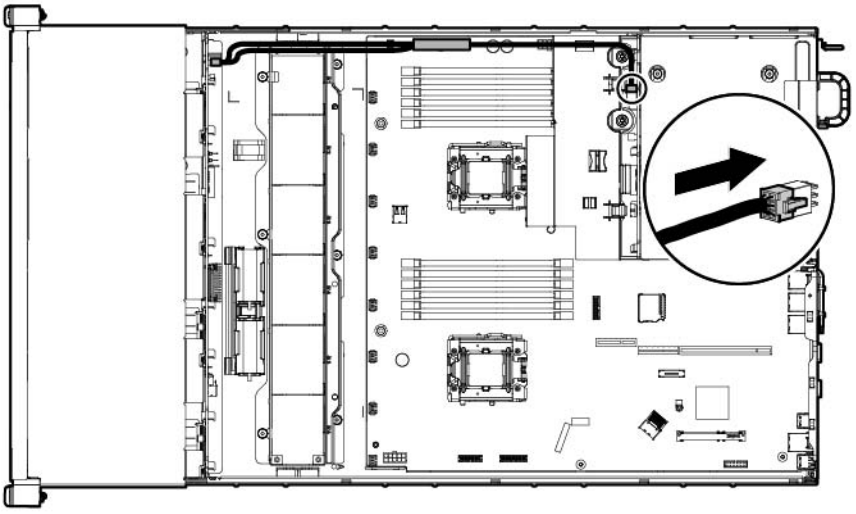


7. Install the rear LFF drive cage.

Ensure the cage latch is secured in place before tightening the drive cage screws.

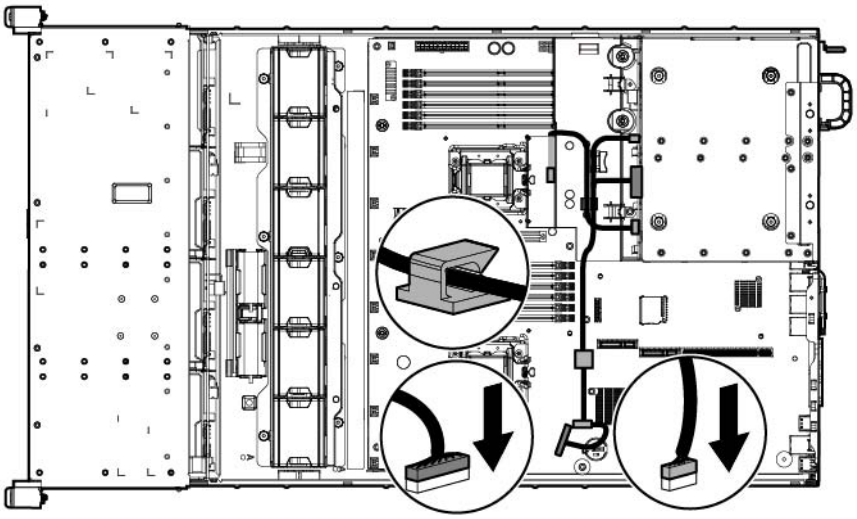


8. Connect the drive power cable to the rear drive cage.



9. Connect the shorter SATA and sideband signal cables to the system board:
   a. Remove the primary PCI riser cage ("Remove the PCI riser cages" on page 24).
   b. Connect the sideband signal cable from the rear drive cage to the system board.

c. Connect the SATA cable to the rear drive cage, secure the cable in the cable clip, and then connect the cable to the system board.



d. Install the primary PCI riser cage ("Install the PCI riser cages" on page 25).

10. Connect the rest of the drive cables required in this drive configuration. For more information, see "Storage cabling (on page 81)."
11. Install the drives ("Installing a hot-plug drive" on page 36).

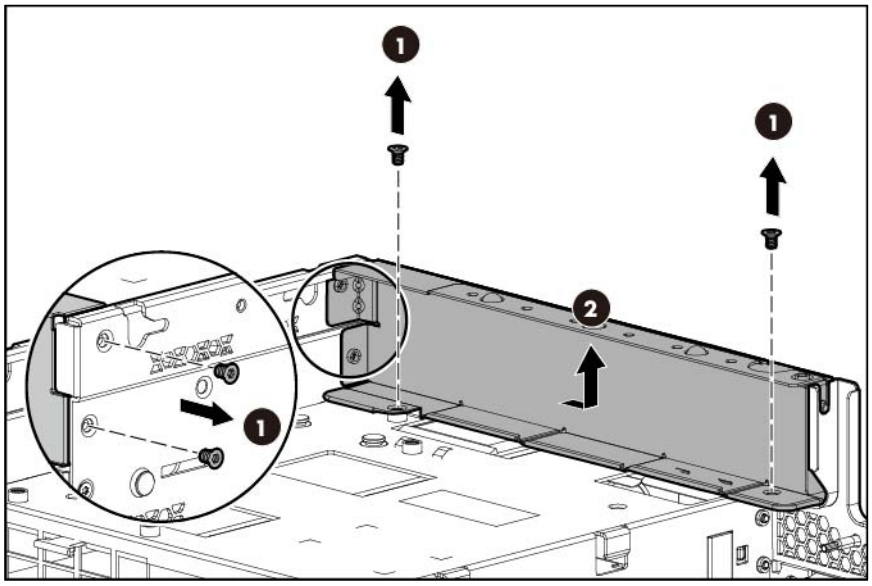
> **CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

12. Install the access panel (on page 23).
13. Install the server into the rack ("Installing the server into the rack" on page 32).
14. Power up the server (on page 19).

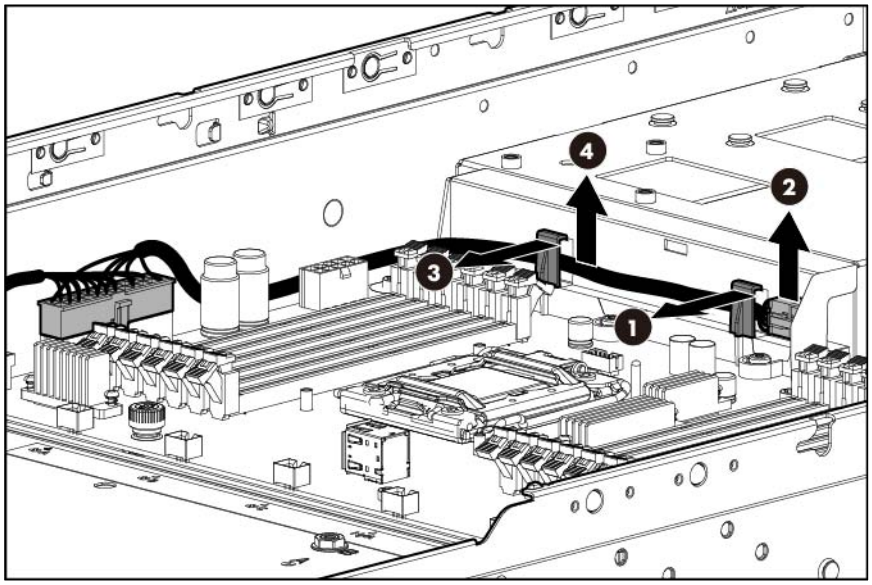
Installing a 2 SFF rear drive cage option

1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   - Extend the server from the rack (on page 19).
   - Remove the server from the rack (on page 21).
4. Remove the access panel (on page 22).

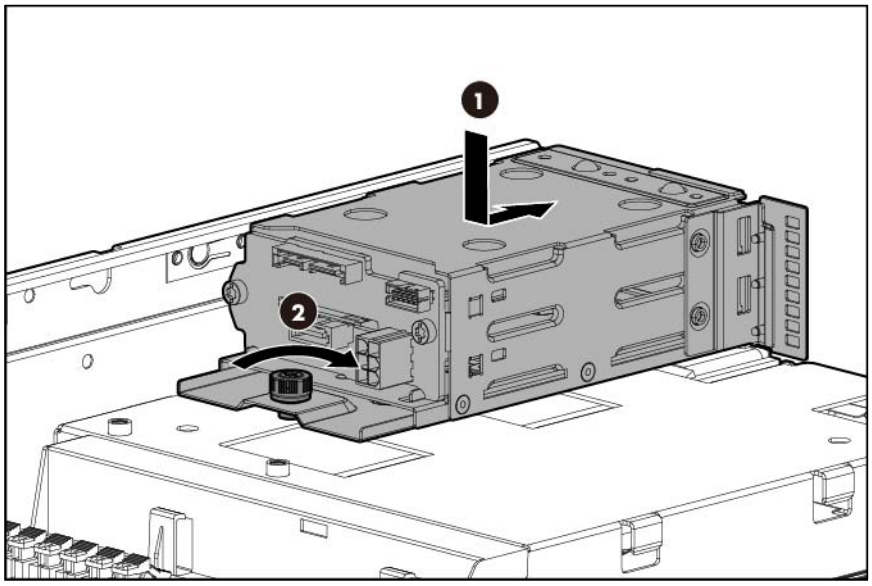
5. Remove the LFF drive cage blank.



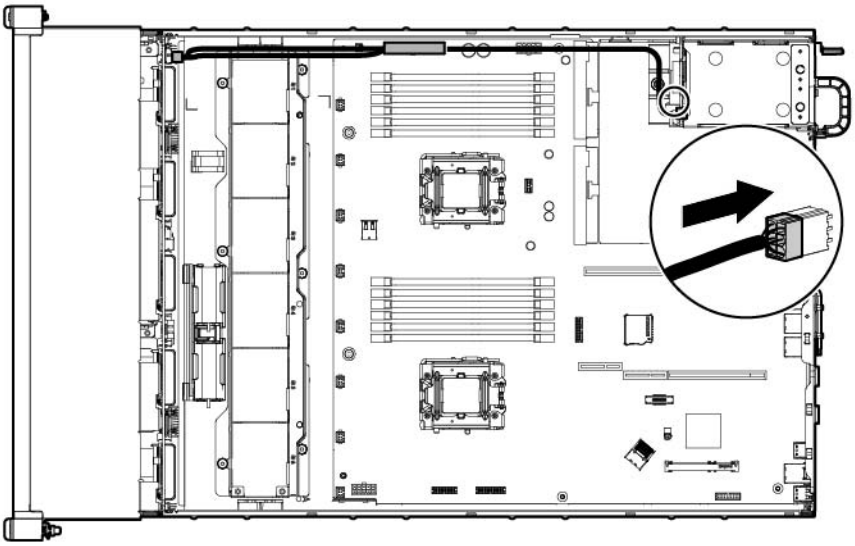
6. Release the drive power cable from the PSU air baffle latches.



7. Install the rear SFF drive cage.

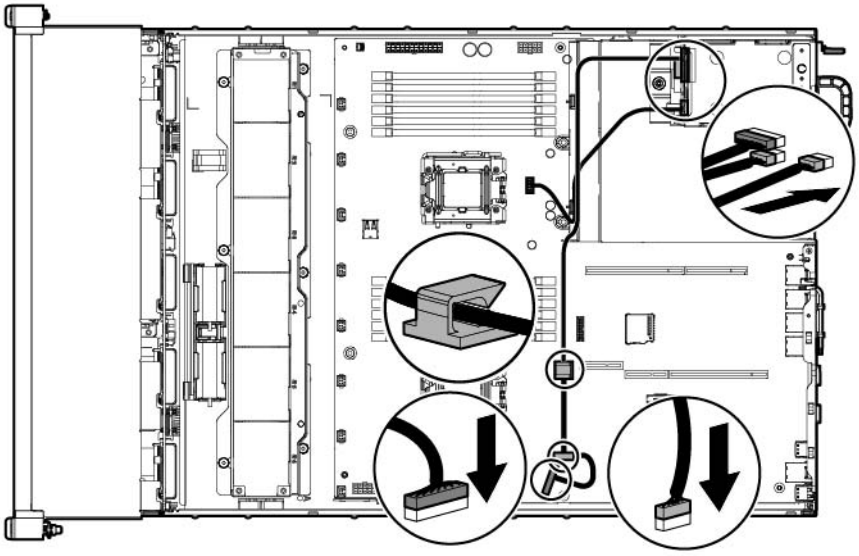


8. Connect the drive power cable to the rear drive cage.



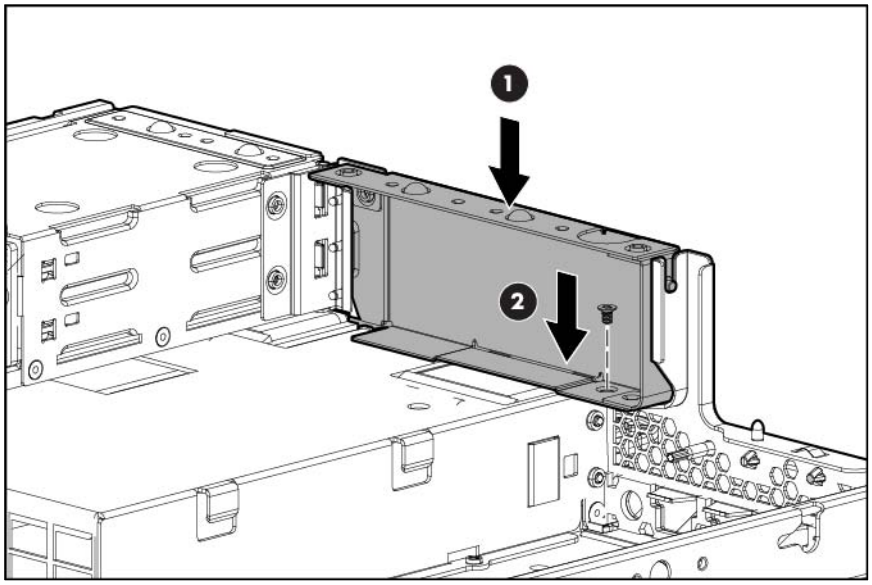
9. Connect the shorter SATA and sideband signal cables to the system board:
   a. Remove the primary PCI riser cage ("Remove the PCI riser cages" on page 24).
   b. Connect the sideband signal cable from the rear drive cage to the system board.

c. Connect the SATA cable to the rear drive cage, secure the cable in the cable clip, and then connect the cable to the system board.



d. Install the primary PCI riser cage ("Install the PCI riser cages" on page 25).

10. If you are not installing the secondary PCI riser cage, then install the secondary PCI riser cage blank.



11. Connect the rest of the drive cables required in this drive configuration. For more information, see "Storage cabling (on page 81)."
12. Install the drives ("Installing a hot-plug drive" on page 36).

> **CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

13. Install the access panel (on page 23).
14. Install the server into the rack ("Installing the server into the rack" on page 32).
15. Power up the server (on page 19).

Drive cable options

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

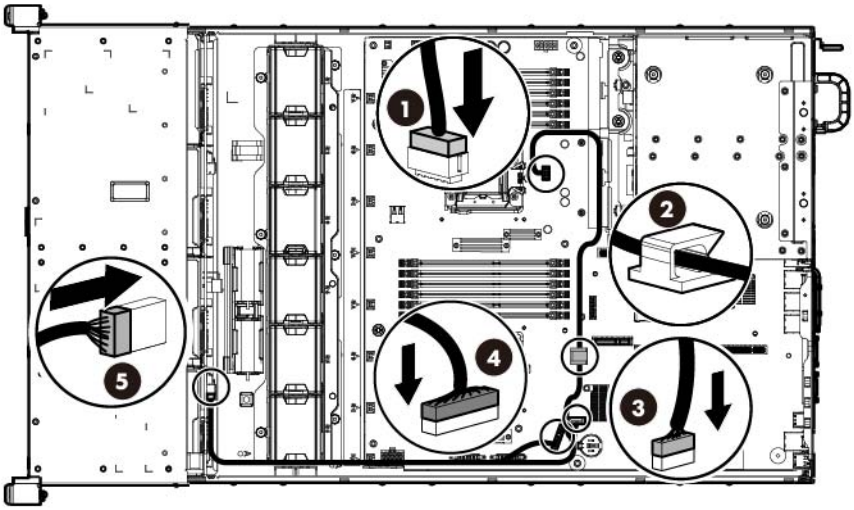
Two-port SATA cable option

When the two-port SATA cable option is installed in the 8-bay drive cage, the server supports the 6-drive SATA configuration. In this configuration, drive bays 1 through 6 are populated, while drive bays 7 and 8 contain drive blanks.

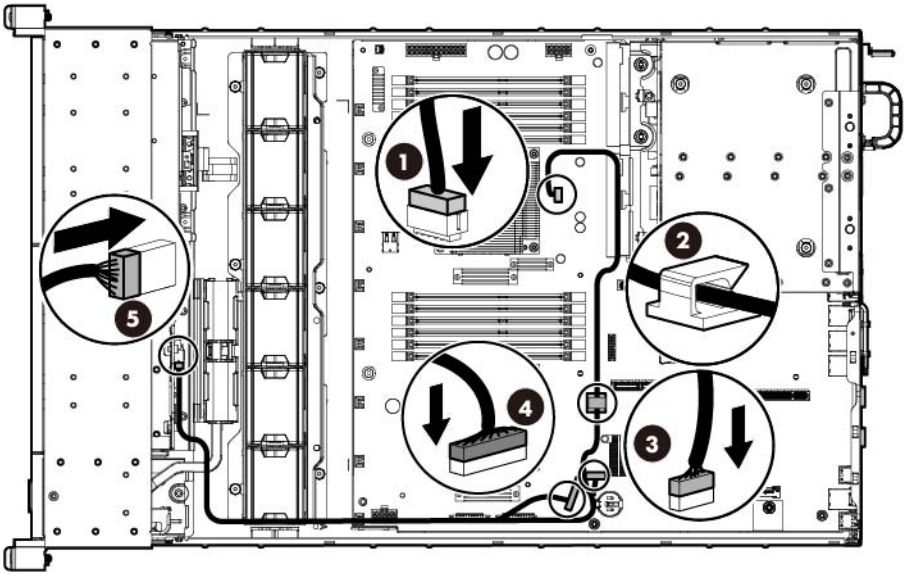
To connect the cable option:

1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   - Extend the server from the rack (on page 19).
   - Remove the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Remove the air baffle (on page 23).
6. Remove the PCI riser cages (on page 24).
7. Connect the two-port SATA cable:
   a. Connect the cable to the drive sideband signal connector.
   b. Secure the cable in the cable clip.
   c. Connect the cable to the SATA storage and optical drive connectors.
   d. Route the cable along the side of the system board towards the front chassis, and then connect the cable to the drive backplane.

   LFF drive



SFF drive



8. Connect the rest of the drive cables required in this drive configuration. For more information, see "Storage cabling (on page 81)."
9. Install the PCI riser cages. ("Install the PCI riser cages" on page 25)
10. Install the air baffle (on page 23).
11. Install the access panel (on page 23).
12. Install the server into the rack ("Installing the server into the rack" on page 32).
13. Power up the server (on page 19).

> △ **CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

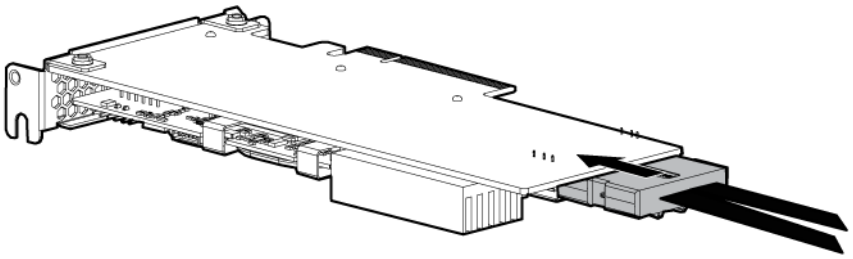
14. Install the drives ("Installing a hot-plug drive" on page 36).

Mini-SAS cable option

To connect the cable option:

1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   - Extend the server from the rack (on page 19).
   - Remove the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Remove the air baffle (on page 23).
6. Remove the PCI riser cage ("Remove the PCI riser cages" on page 24).
7. Install the storage controller ("Installing a storage controller" on page 48).

8. Connect the common end of the Mini-SAS Y-cable to the controller option.



9. Install the PCI riser cage ("Install the PCI riser cages" on page 25).
10. Route the split ends of the Mini-SAS Y-cable along the side of the system board towards the front chassis, and then connect the cable to the drive backplane.

    The Mini-SAS cable routing from the secondary PCI riser cage is only supported in the 8+8 SFF drive configuration.
11. Connect the rest of the drive cables required in this drive configuration. For more information, see "Storage cabling (on page 81)."
12. Install the PCI riser cage ("Install the PCI riser cages" on page 25).
13. If you intend to use an FBWC module and capacitor pack, install these options now ("Installing the FBWC module and capacitor pack" on page 49).
14. Install the air baffle (on page 23).
15. Install the access panel (on page 23).
16. Install the server into the rack ("Installing the server into the rack" on page 32).
17. Power up the server (on page 19).

    △ **CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.
18. Install the drives ("Installing a hot-plug drive" on page 36).

Mini-SAS Y-cable options

The Mini-SAS Y-cables in these option kits support the following drive configurations.

Drive configuration	Mini-SAS Y-cable required
8 LFF	690 mm
8 SFF	540 mm
8+8 SFF*	540 mm and 780 mm

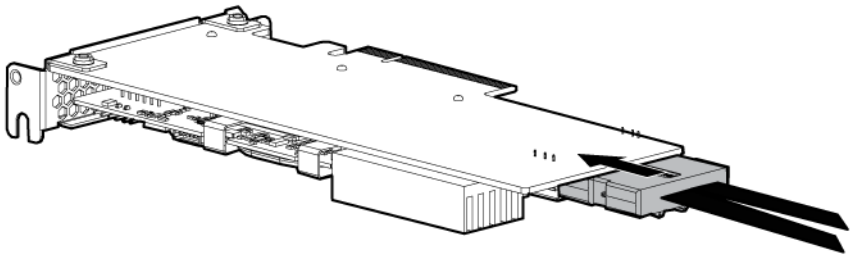
* This drive configuration requires the installation of two HP Smart Array P430 controller boards in the full-height side of the primary PCI riser cage.

To connect the cable option:

1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.

b. Disconnect each power cord from the server.

3. Do one of the following:
   - Extend the server from the rack (on page 19).
   - Remove the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Remove the air baffle (on page 23).
6. Disconnect all cables connected to existing expansion boards.
7. Remove the PCI riser cage ("Remove the PCI riser cages" on page 24).
8. Install the storage controller ("Installing a storage controller" on page 48).
9. Connect the common end of the Mini-SAS Y-cable to the controller option.



10. Install the PCI riser cage ("Install the PCI riser cages" on page 25).
11. Route the split ends of the Mini-SAS Y-cable along the side of the system board towards the front chassis, and then connect the cable to the drive backplane.
12. Connect the rest of the drive cables required in this drive configuration. For more information, see "Storage cabling (on page 81)."
13. If you intend to use an FBWC module and capacitor pack, install these options now ("Installing the FBWC module and capacitor pack" on page 49).
14. Install the air baffle (on page 23).
15. Install the access panel (on page 23).
16. Install the server into the rack ("Installing the server into the rack" on page 32).
17. Power up the server (on page 19).

CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

18. Install the drives ("Installing a hot-plug drive" on page 36).

Controller options

The server ships with an embedded Smart Array B120i controller. For more information about the controller and its features, see the *HP Dynamic Smart Array RAID Controller User Guide* on the HP website (http://www.hp.com/go/smartstorage/docs).

Upgrade options exist for an integrated array controller. For a list of supported options, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

To configure arrays, see the *HP Smart Storage Administrator User Guide* on the HP website (http://www.hp.com/go/smartstorage/docs).

The server supports FBWC. FBWC consists of a cache module and a capacitor pack. The DDR cache module buffers and stores data being written by the controller. When the system is powered on, the capacitor pack fully charges in approximately 5 minutes. If a system power failure occurs, a fully charged capacitor pack provides power for up to 80 seconds. During that interval, the controller transfers the cached data from DDR memory to flash memory, where the data remains indefinitely or until a controller retrieves the data.

The data protection and the time limit also apply if a power outage occurs. When power is restored to the system, an initialization process writes the preserved data to the storage drives.

CAUTION: The cache module connector does not use the industry-standard DDR3 mini-DIMMs. Do not use the controller with cache modules designed for other controller models, because the controller can malfunction and you can lose data. Also, do not transfer this cache module to an unsupported controller model, because you can lose data.

CAUTION: To prevent a server malfunction or damage to the equipment, do not add or remove the capacitor pack while an array capacity expansion, RAID level migration, or stripe size migration is in progress.

CAUTION: After the server is powered down, wait for 30 seconds, and then check the amber LED before unplugging the cable from the cache module. If the amber LED flashes after 30 seconds, do not remove the cable from the cache module. The cache module is backing up data. Data will be lost if the cable is detached when the amber LED is still flashing.

IMPORTANT: The capacitor pack might have a low charge when installed. If the pack does have low charge a POST error message appears when the server is powered up, indicating that the capacitor pack is temporarily disabled. No action is necessary. The internal circuitry automatically recharges the capacitors and enables the capacitor pack. This process might take up to 4 hours. During this time, the cache module functions properly but without the performance advantage of the capacitor pack.

Storage controller installation guidelines

- Install the storage controller option in slots 1–3 of the primary PCI riser cage.
- Do not install a storage controller option in slot 4 of the primary PCI riser cage.
- The secondary PCI riser cage option supports storage controller installation.
- For more information on the riser board slot specifications, see "PCIe riser board slot definitions (on page 12)."

Installing a storage controller

HP recommends installing the storage controller option in a full-height expansion slot for better cable routing.

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

IMPORTANT: For additional installation and configuration information, see the documentation that ships with the option.

To install the component:

1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   - Extend the server from the rack (on page 19).
   - Remove the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Remove the PCI riser cage ("Remove the PCI riser cages" on page 24).
6. If you intend to use an FBWC module and capacitor pack, install these options now ("Installing the FBWC module and capacitor pack" on page 49).
7. Install the storage controller.
8. Install the PCI riser cage ("Install the PCI riser cages" on page 25).
9. Connect all necessary internal cables to the storage controller. For internal drive cabling information, see "Storage cabling (on page 81)."
10. Install the access panel (on page 23).
11. Install the server into the rack ("Installing the server into the rack" on page 32).
12. Connect all necessary external cables to the storage controller. For more information on these cabling requirements, see the documentation that ships with the option.
13. Power up the server (on page 19).

> △ **CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

14. Install the drives ("Installing a hot-plug drive" on page 36).

For more information about the integrated storage controller and its features, select the relevant user documentation on the HP website (http://www.hp.com/go/smartstorage/docs).

To configure arrays, see the *HP Smart Storage Administrator User Guide* on the HP website (http://www.hp.com/go/smartstorage/docs).

Installing the FBWC module and capacitor pack

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

> △ **CAUTION:** In systems that use external data storage, be sure that the server is the first unit to be powered down and the last to be powered back up. Taking this precaution ensures that the system does not erroneously mark the external drives as failed when the server is powered up.

To install the component:

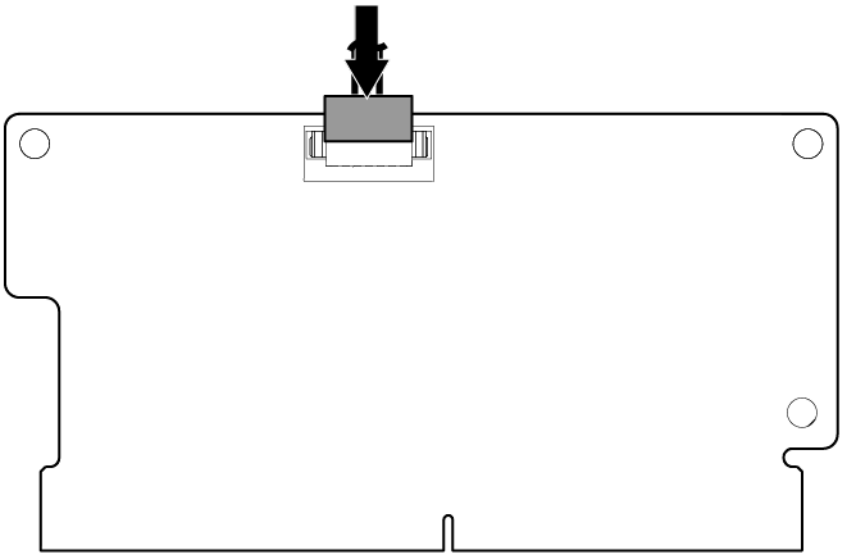
1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.

b. Disconnect each power cord from the server.

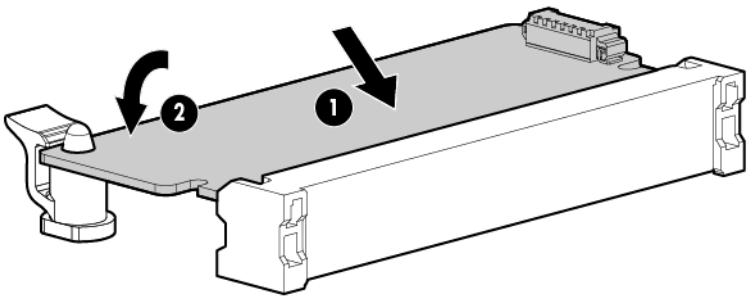
3. Do one of the following:
   - Extend the server from the rack (on page 19).
   - Remove the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Do one of the following:
   - If you are installing the cache module on the system board or in a storage controller installed in the primary PCI riser cage, remove the primary PCI riser cage ("Remove the PCI riser cages" on page 24).
   - If you are installing the cache module on a storage controller installed in the optional secondary PCI riser cage, remove the secondary PCI riser cage ("Remove the PCI riser cages" on page 24).

CAUTION: When connecting or disconnecting the capacitor pack cable, the connectors on the cache module and cable are susceptible to damage. Avoid excessive force and use caution to avoid damage to these connectors.

6. Connect the capacitor pack cable to the cache module.

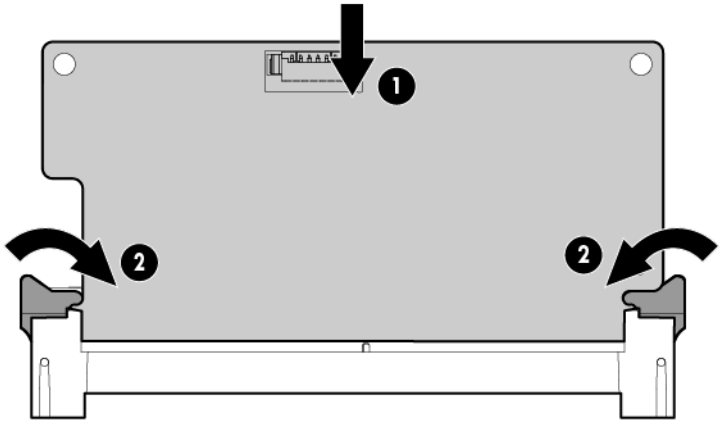


7. When using the embedded array controller:
   a. Install the cache module on the system board.



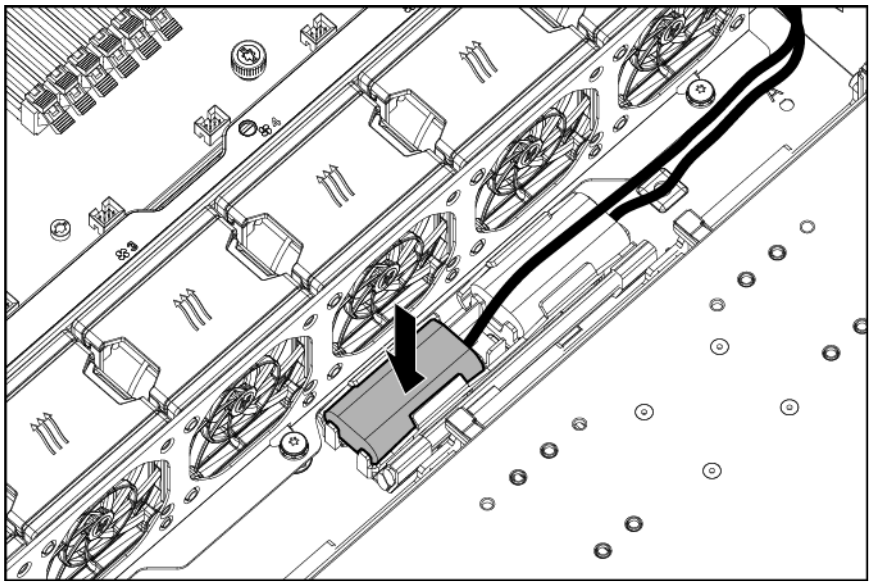
   b. Install the PCI riser cage ("Install the PCI riser cages" on page 25).

8. When using an integrated array controller:
   a. Install the cache module on the storage controller.



   b. Install the storage controller ("Installing a storage controller" on page 48).
   c. Install the PCI riser cage ("Install the PCI riser cages" on page 25).
9. Install the capacitor pack:
   a. Insert the cable end of the capacitor pack in the holder.
   b. Press the opposite end of the capacitor pack in the holder.

   For more information on capacitor pack cabling in different drive configurations, see "Storage cabling (on page 81)."



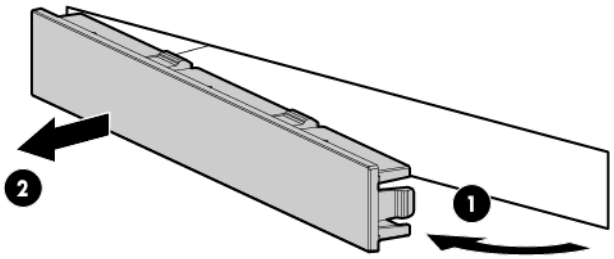
10. Install the access panel (on page 23).
11. Install the server into the rack ("Installing the server into the rack" on page 32).
12. Power up the server (on page 19).

Optical drive option

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

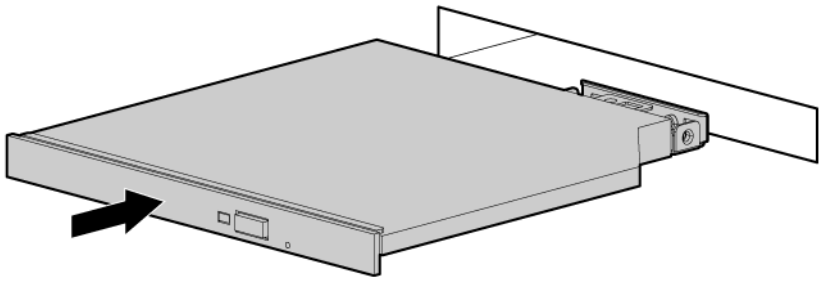
To install the component:

1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   - Extend the server from the rack (on page 19).
   - Remove the server from the rack (on page 21).
4. Remove the optical drive blank.



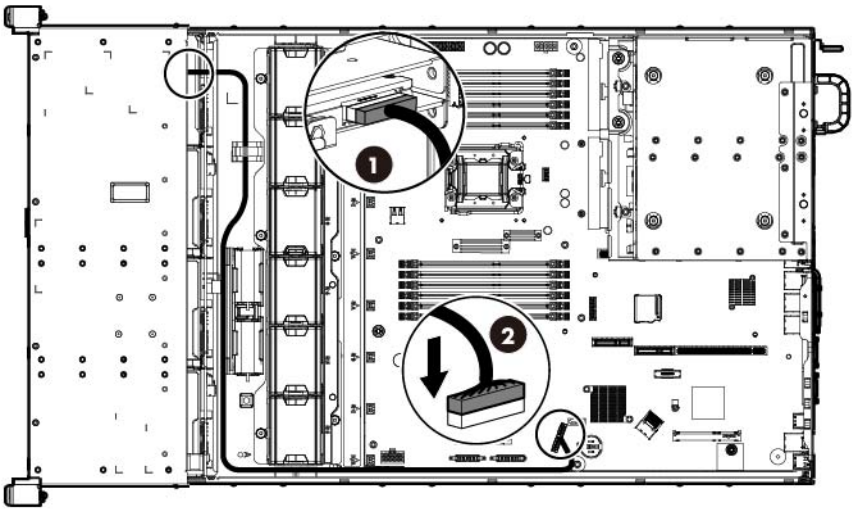
Retain the blank for future use.

5. Remove the access panel (on page 22).
6. Remove the air baffle (on page 23).
7. Remove the primary PCI riser cage ("Remove the PCI riser cages" on page 24).
8. Install the optical drive into the bay.



9. Connect the optical drive cable to the optical drive.

10. Route the optical drive cable along the side of the system board, and then connect the cable to the system board.

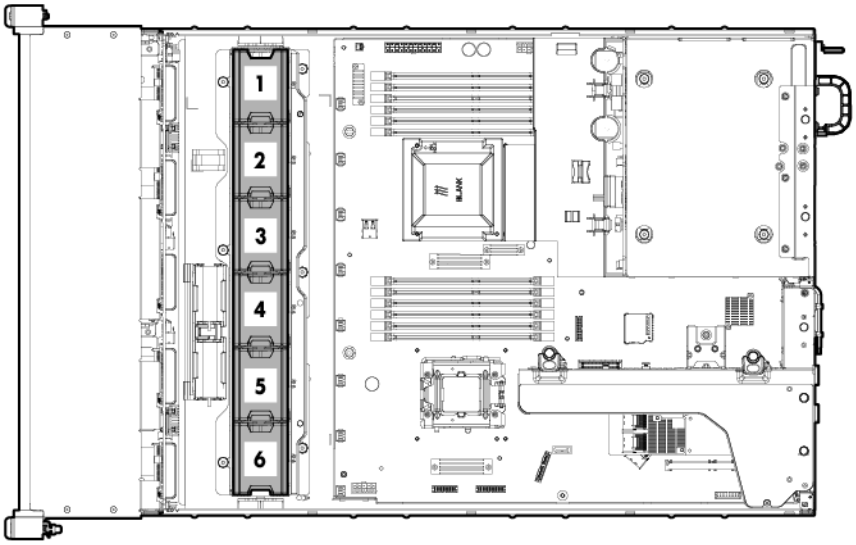


11. Install the primary PCI riser cage ("Install the PCI riser cages" on page 25).
12. Install the air baffle (on page 23).
13. Install the access panel (on page 23).
14. Install the server into the rack ("Installing the server into the rack" on page 32).
15. Power up the server (on page 19).

Hot-plug fan module option

To provide sufficient airflow to the system if a primary fan fails, the server supports redundant fans.

Fan population guidelines



Configuration	Fan bay 1	Fan bay 2	Fan bay 3	Fan bay 4	Fan bay 5	Fan bay 6
One processor, nonredundant	Blank	Fan	Blank	Fan	Fan	Fan
One processor, redundant	Fan	Fan	Blank	Fan	Fan	Fan
Two processor, nonredundant	Fan	Fan	Fan	Fan	Fan	Blank
Two processor, redundant	Fan	Fan	Fan	Fan	Fan	Fan

- In a redundant fan mode:
  - If one fan fails, the system continues to operate without redundancy. This condition is indicated by a flashing amber Health LED.
  - If two fans fail, the system shuts down.
- The minimum fan requirement to make this server bootable is four fans in bays 2, 4, 5, and 6.

Installing a hot-plug fan module if the server is installed in a ball-bearing rail system with the cable management arm

CAUTION: To prevent the potential for thermal damage and system shutdown, ensure that a functioning server has all feature bays populated with the required component or blank and the access panel is installed within 60 seconds of being serviced.

1. Pull down the quick release levers on each side of the server.

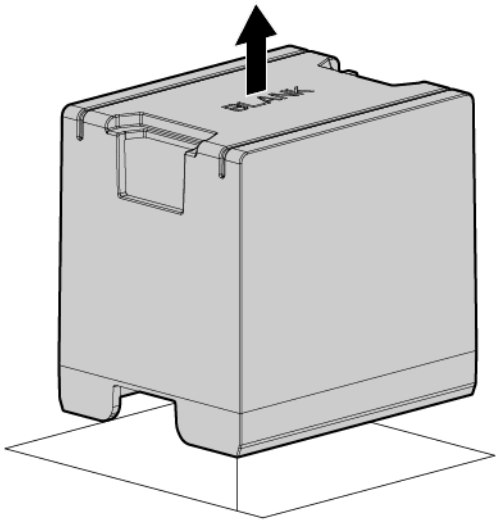
WARNING: To reduce the risk of personal injury or equipment damage, be sure that the rack is adequately stabilized before extending a component from the rack.

2. Extend the server on the rack rails until the server rail-release latches engage.

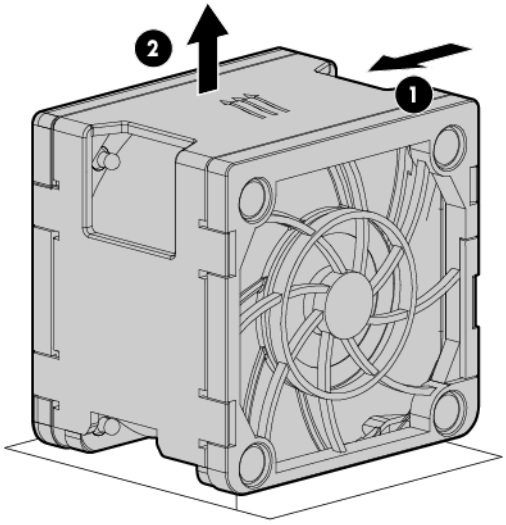
   If the server does not extend from the rack, use a T-25 Torx screwdriver to loosen the screws located within the lever housing.
3. Open the latch, slide the access panel to the rear of the chassis, and then remove the access panel.

   If the latch is locked, use a T-15 Torx screwdriver to unlock the latch.
4. Do one of the following:

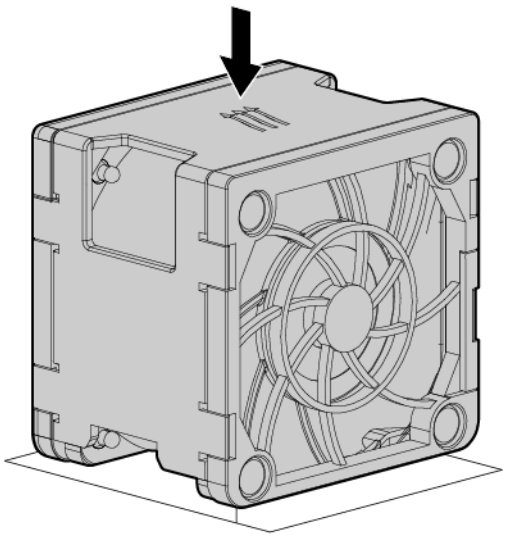
- Remove the fan blank in a nonredundant configuration.



- Remove the defective fan in a failed redundant fan configuration.



5. Install the fan module into the fan bay.

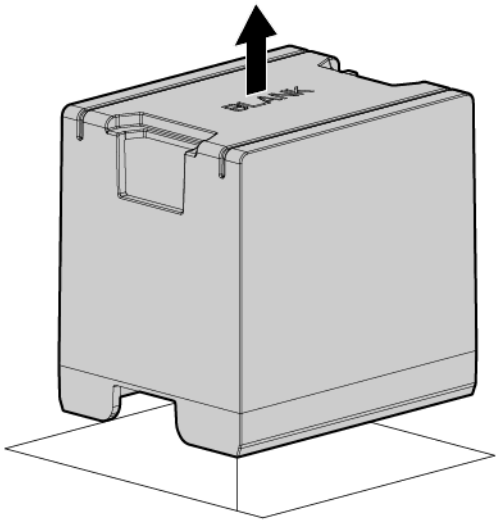


6. Install the access panel (on page 23).
7. Slide the server back into the rack.
8. If the fan installation was made to upgrade the server from a nonredundant to a redundant fan mode, reboot the server.

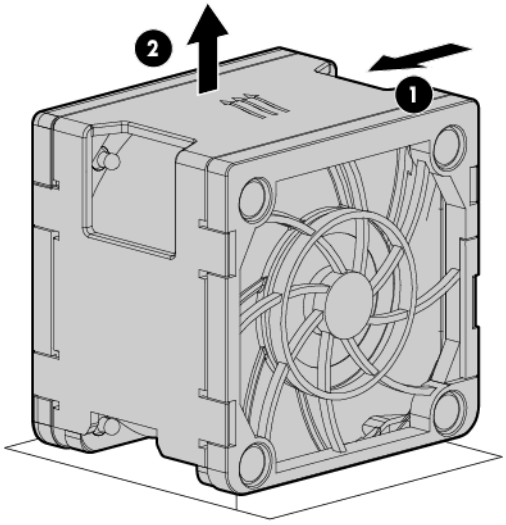
Installing the hot-plug fan module if the server is installed in a friction rail system

1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Remove the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Do one of the following:

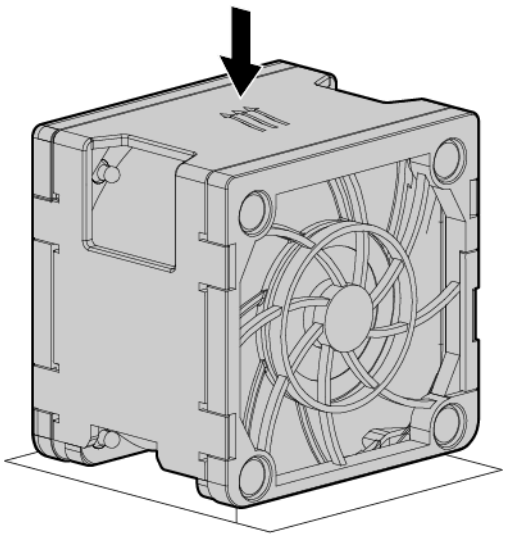
- Remove the fan blank in a nonredundant configuration.



- Remove the defective fan in a failed redundant configuration.



6. Install the fan module into the fan bay.



CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

7. Install the access panel (on page 23).
8. Install the server into the rack ("Installing the server into the rack" on page 32).
9. Power up the server (on page 19).

Memory options

IMPORTANT: This server does not support mixing LRDIMMs, RDIMMs, or UDIMMs. Attempting to mix any combination of these DIMMs can cause the server to halt during BIOS initialization.

The memory subsystem in this server can support LRDIMMs, RDIMMs, or UDIMMs.

- UDIMMs represent the basic type of memory module and offer lower latency and (relatively) low power consumption, but are limited in capacity.
- RDIMMs offer larger capacities than UDIMMs and include address parity protection.
- LRDIMMs support higher densities than single-rank and dual-rank RDIMMs. This support enables you to install more high capacity DIMMs, resulting in higher system capacities and higher bandwidth.

All types are referred to as DIMMs when the information applies to all types. When specified as LRDIMM, RDIMM, or UDIMM, the information applies to that type only. All memory installed in the server must be of the same type.

The server supports the following DIMM speeds:

- Single-rank and dual-rank PC3-10600 (DDR-1333) UDIMMs operating at up to 1333 MT/s
- Single-rank and dual-rank PC3-12800 (DDR-1600) UDIMMs operating at up to 1600 MT/s
- Single-rank and dual-rank PC3-10600 (DDR-1333) RDIMMs operating at up to 1333 MT/s
- Single-rank and dual-rank PC3-12800 (DDR-1600) RDIMMs operating at up to 1600 MT/s

- Quad-rank PC3L-10600 (DDR3L-1333) LRDIMMs operating at up to 1333 MT/s

Depending on the processor model, the number of DIMMs installed, and whether LRDIMMs, UDIMMs, or RDIMMs are installed, the memory clock speed can be reduced to 1333 or 1066 MT/s. Clock speed can also be reduced when using low-voltage DIMMs.

Supported DIMM specifications

Type	Rank	Capacity	Native speed	Voltage
RDIMM	Single	4 GB, 8 GB	1600 MT/s	STD
RDIMM	Dual	4 GB, 8 GB	1600 MT/s	STD
RDIMM	Single	4 GB, 8 GB	1600 MT/s	LV
RDIMM	Dual	8 GB,16 GB	1600 MT/s	LV
LRDIMM	Quad	32 GB	1333 MT/s	LV
UDIMM	Single	2 GB	1600 MT/s	LV
UDIMM	Single	2 GB	1600 MT/s	STD
UDIMM	Dual	4 GB, 8 GB	1600 MT/s	LV
UDIMM	Dual	4 GB	1600 MT/s	STD

Populated DIMM speed (MT/s)

Type	Rank	1 DIMM per channel	2 DIMMs per channel
RDIMM	Single (8 GB)	1600 MT/s	1600 MT/s
RDIMM	Dual (8 GB)	1600 MT/s	1600 MT/s
RDIMM	Dual (16 GB)	1600 MT/s	1600 MT/s
LRDIMM	Quad (32 GB)	1333 MT/s**	1333 MT/s**
UDIMM	Dual (8 GB)	1600 MT/s	1600 MT/s

** LRDIMM enables 2 DPC. HP SmartMemory supports up to 2 DPC at 1333 MT/s at 1.35 V. Third-party memory supports only 1.5 V.

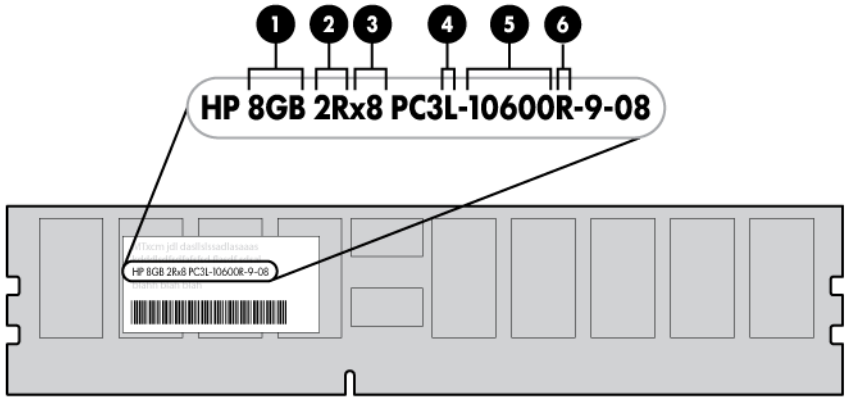
HP SmartMemory

HP SmartMemory, introduced for Gen8 servers, authenticates and unlocks certain features available only on HP Qualified memory and verifies whether installed memory has passed HP qualification and test processes. Qualified memory is performance-tuned for HP ProLiant and BladeSystem servers and provides future enhanced support through HP Active Health and manageability software.

Certain performance features are unique with HP SmartMemory. HP SmartMemory 1.35V DDR3-1333 Registered memory is engineered to achieve the same performance level as 1.5V memory. For example, while the industry supports DDR3-1333 RDIMM at 1.5V, this Gen8 server supports DDR3-1333 RDIMM up to 3 DIMMs per channel at 1066 MT/s running at 1.35V. This equates to up to 20% less power at the DIMM level with no performance penalty. In addition, the industry supports UDIMM at 2 DIMMs per channel at 1066 MT/s. HP SmartMemory supports 2 DIMMs per channel at 1333 MT/s, or 25% greater bandwidth.

DIMM identification

To determine DIMM characteristics, use the label attached to the DIMM and the following illustration and table.



Item	Description	Definition
1	Size	—
2	Rank	1R = Single-rank 2R = Dual-rank 3R = Three-rank 4R = Quad-rank
3	Data width	x4 = 4-bit x8 = 8-bit
4	Voltage rating	L = Low voltage (1.35V) U = Ultra low voltage (1.25V) Blank or omitted = Standard
5	Memory speed	12800 = 1600-MT/s 10600 = 1333-MT/s 8500 = 1066-MT/s
6	DIMM type	R = RDIMM (registered) E = UDIMM (unbuffered with ECC) L = LRDIMM (load reduced)

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

Single-rank and dual-rank DIMMs

DIMM configuration requirements are based on these classifications:

- Single-rank DIMM—One set of memory chips that is accessed while writing to or reading from the memory.
- Dual-rank DIMM—Two single-rank DIMMs on the same module, with only one rank accessible at a time.

The server memory control subsystem selects the proper rank within the DIMM when writing to or reading from the DIMM.

Dual-rank DIMMs provide the greatest capacity with the existing memory technology. For example, if current DRAM technology supports 2-GB single-rank DIMMs, a dual-rank DIMM would be 4 GB.

Memory subsystem architecture

The memory subsystem in this server is divided into channels. Each processor supports three channels, and each channel supports two DIMM slots.

Channel	Population order	Slot number
1	A D	1 2
2	B E	3 4
3	C F	5 6

DIMM slots in this server are identified by number and by letter. Letters identify the population order. Slot numbers are reported by ROM messages during boot and for error reporting. For more information, see "DIMM slot locations (on page 14)."

Memory protection modes

To optimize server availability, the server supports the following AMP modes:

- Advanced ECC—Provides up to 4-bit error correction and enhanced performance over Lockstep memory mode. This mode is the default option for the server.
- Online Spare Memory—Provides protection against failing or degraded DIMMs. Certain memory is reserved as spare, and automatic failover to spare memory occurs when the system detects a DIMM that is degrading. This enables DIMMs that have a higher probability of receiving an uncorrectable memory error (which results in system downtime) to be removed from operation.

The server also can operate in independent channel mode or combined channel mode (Lockstep Memory mode). When running in Lockstep Memory mode, you gain reliability in one of two ways:

- If running with UDIMMs (built with x8 DRAM devices), the system can survive a complete DRAM failure (SDDC). In independent channel mode, this failure would be an uncorrectable error.
- If running with RDIMM (built with x4 DRAM devices), the system can survive the complete failure of two DRAM devices (DDDC). Running in independent mode, the server can only survive the complete failure of a single DRAM device (SDDC).

Advanced Memory Protection options are configured in RBSU. If the requested AMP mode is not supported by the installed DIMM configuration, the server boots in Advanced ECC mode. For more information, see "HP ROM-Based Setup Utility (on page 102)."

Advanced ECC

Advanced ECC memory is the default memory protection mode for the server. Standard ECC can correct single-bit memory errors and detect multibit memory errors. When multibit errors are detected using Standard ECC, the error is signaled to the server and causes the server to halt.

Advanced ECC protects the server against some multibit memory errors. Advanced ECC can correct both single-bit memory errors and 4-bit memory errors if all failed bits are on the same DRAM device on the DIMM.

Advanced ECC provides additional protection over Standard ECC because it is possible to correct certain memory errors that would otherwise be uncorrected and result in a server failure. Using HP Advanced Memory Error Detection technology, the server provides notification when a DIMM is degrading and has a higher probability of uncorrectable memory error.

Online Spare memory

Online Spare memory mode provides protection against degraded DIMMs by reducing the likelihood of uncorrected memory errors. This protection is available without any operating system support.

Online Spare memory protection dedicates one rank of each memory channel for use as spare memory. The remaining ranks are available for OS and application use. If correctable memory errors occur at a rate higher than a specific threshold on any of the non-spare ranks, the server automatically copies the memory contents of the degraded rank to the online spare rank. The server then deactivates the failing rank and automatically switches over to the online spare rank.

Lockstep Memory mode

Lockstep memory mode provides protection against multibit memory errors that occur on the same DRAM device. Lockstep memory mode can correct any single DRAM device failure on x4 and x8 DIMM types. The DIMMs in each channel must have identical HP part numbers.

Lockstep memory mode uses channel 2 and channel 3. Channel 1 is not populated. Because channel 1 cannot be populated when using Lockstep memory mode, the maximum memory capacity is lower than Advanced ECC mode. Memory performance with Advanced ECC is also slightly higher.

Maximum capacity

Type	Rank	Single processor	Dual processors
RDIMM	Single	48 GB	96 GB
RDIMM	Dual	96 GB	192 GB
LRDIMM	Quad	192 GB	384 GB
UDIMM	Single	12 GB	24 GB
UDIMM	Dual	48 GB	96 GB

Memory population guidelines

General DIMM slot population guidelines

Observe the following guidelines for all AMP modes:

- Install DIMMs only if the corresponding processor is installed.
- Do not mix LRDIMMs, UDIMMs, or RDIMMs.
- White DIMM slots denote the first slot of a channel (1-A, 2-B, 3-C).
- When two processors are installed, install the DIMMs in sequential alphabetical order balanced between the two processors: P1-A, P2-A, P1-B, P2-B, P1-C, P2-C, and so forth.
- The minimum DIMM requirement to make this server bootable is one DIMM installed in slot 1-A.

For detailed memory configuration rules and guidelines, use the Online DDR3 Memory Configuration Tool on the HP website (http://www.hp.com/go/ddr3memory-configurator).

Advanced ECC population guidelines

For Advanced ECC mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines.
- DIMMs may be installed individually.

Population order

For memory configurations with a single processor or multiple processors, populate the DIMM slots sequentially in alphabetical order (A through F).

For Advanced ECC mode configurations with multiple processors, populate the DIMM slots sequentially in alphabetical order (P1-A, P2-A, P1-B, P2-B and so forth)

After installing the DIMMs, use RBSU ("HP ROM-Based Setup Utility" on page 102) to configure the memory protection modes.

Online Spare population guidelines

For Online Spare memory mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines.
- Each channel must have a valid online spare configuration.
- Each channel can have a different valid online spare configuration.
- Each populated channel must have a spare rank:
  - A single dual-rank DIMM is not a valid configuration.
  - LRDIMMs are treated as dual-rank DIMMs.

Population order

For Online Spare memory mode configurations with a single processor or multiple processors, populate the DIMM slots sequentially in alphabetical order (A through F).

For Online Spare memory mode configurations with multiple processors, populate the DIMM slots sequentially in alphabetical order (P1-A, P2-A, P1-B, P2-B and so forth).

After installing the DIMMs, to configure memory protection mode, use RBSU ("HP ROM-Based Setup Utility" on page 102).

Lockstep Memory mode population guidelines

For Lockstep memory mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines.
- Always install DIMMs in channel 2 and 3 for each installed processor.
- Do not install DIMMs in channel 1 for any processor.
- DIMM configuration in channel 2 and channel 3 of a processor must be identical.

- In multiprocessor configurations, each processor must have a valid Lockstep memory mode configuration.
- In multiprocessor configurations, each processor may have a different valid Lockstep memory mode configuration.

Population order

For Lockstep memory mode configurations with a single processor or multiple processors, populate the DIMM slots in the following order:

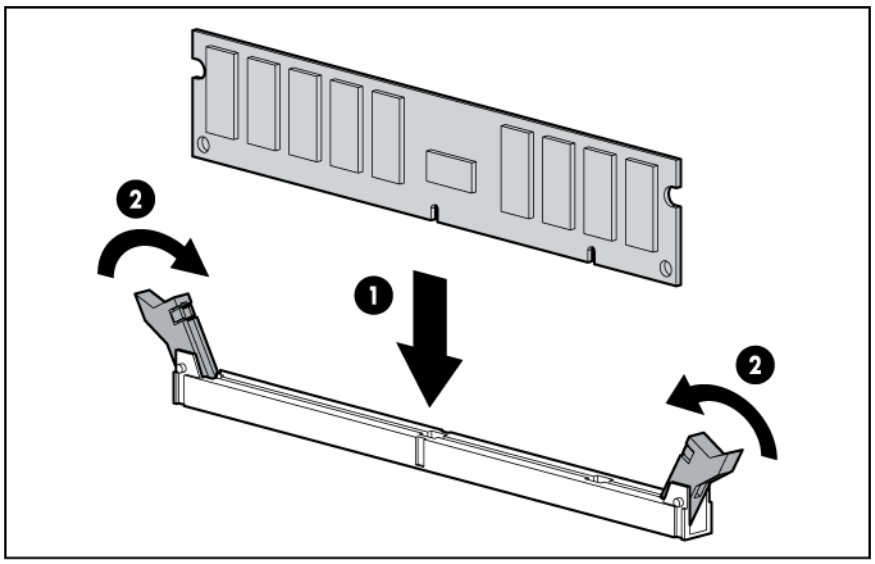
- First: B and C
- Last: E and F

Do not populate the DIMM slots A and D.

After installing the DIMMs, to configure memory protection mode, use RBSU ("HP ROM-Based Setup Utility" on page 102).

Installing a DIMM

1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   - Extend the server from the rack (on page 19).
   - Remove the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Remove the air baffle (on page 23).
6. Open the DIMM slot latches.
7. Install the DIMM.



8. Install the air baffle (on page 23).

9. Install the access panel (on page 23).
10. Install the server into the rack ("Installing the server into the rack" on page 32).
11. Power up the server (on page 19).

After installing the DIMMs, use RBSU ("HP ROM-Based Setup Utility" on page 102) to configure the memory protection mode.

Processor option

The server supports single-processor and dual-processor operations.

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

CAUTION: To avoid damage to the processor and system board, only authorized personnel should attempt to replace or install the processor in this server.

CAUTION: To prevent possible server overheating, always populate each processor socket with a processor socket cover and a heatsink blank or a processor and a heatsink.

CAUTION: To prevent possible server malfunction and damage to the equipment, multiprocessor configurations must contain processors with the same part number.

IMPORTANT: If installing a processor with a faster speed, update the system ROM before installing the processor.

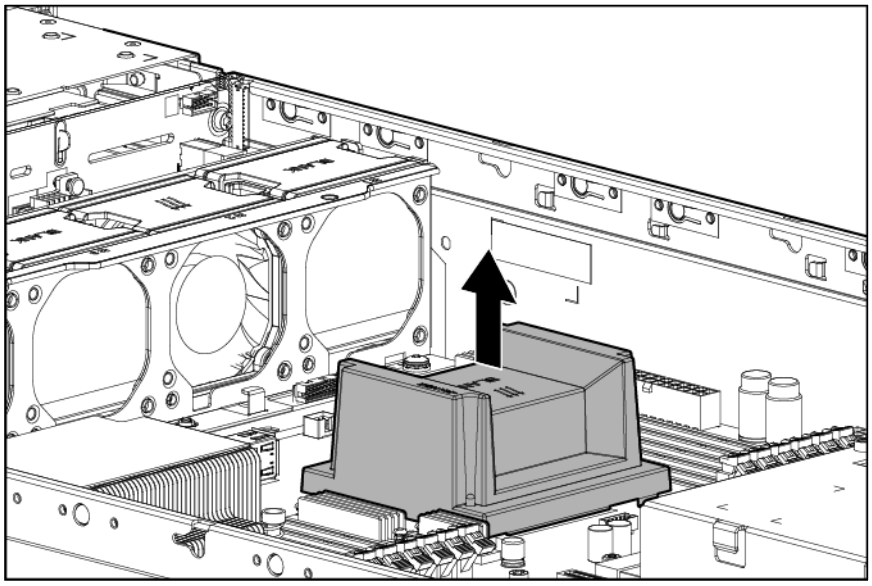
IMPORTANT: Processor socket 1 must be populated at all times or the server does not function.

In a multiprocessor configuration, to optimize system performance, HP recommends balancing the total capacity of the DIMMs across the processors.

To install the component:

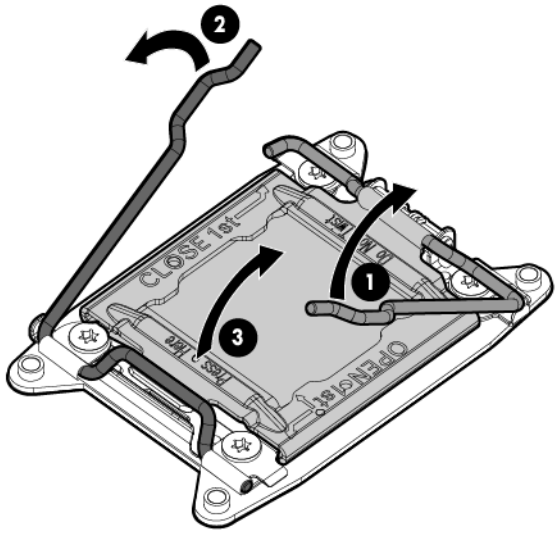
1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   - Extend the server from the rack (on page 19).
   - Remove the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Remove the air baffle (on page 23).

6. Remove the heatsink blank.

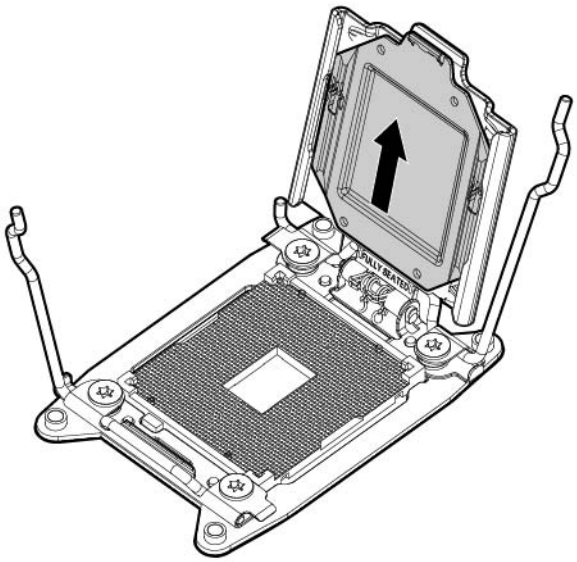


△ **CAUTION:** The pins on the processor socket are very fragile. Any damage to them may require replacing the system board.

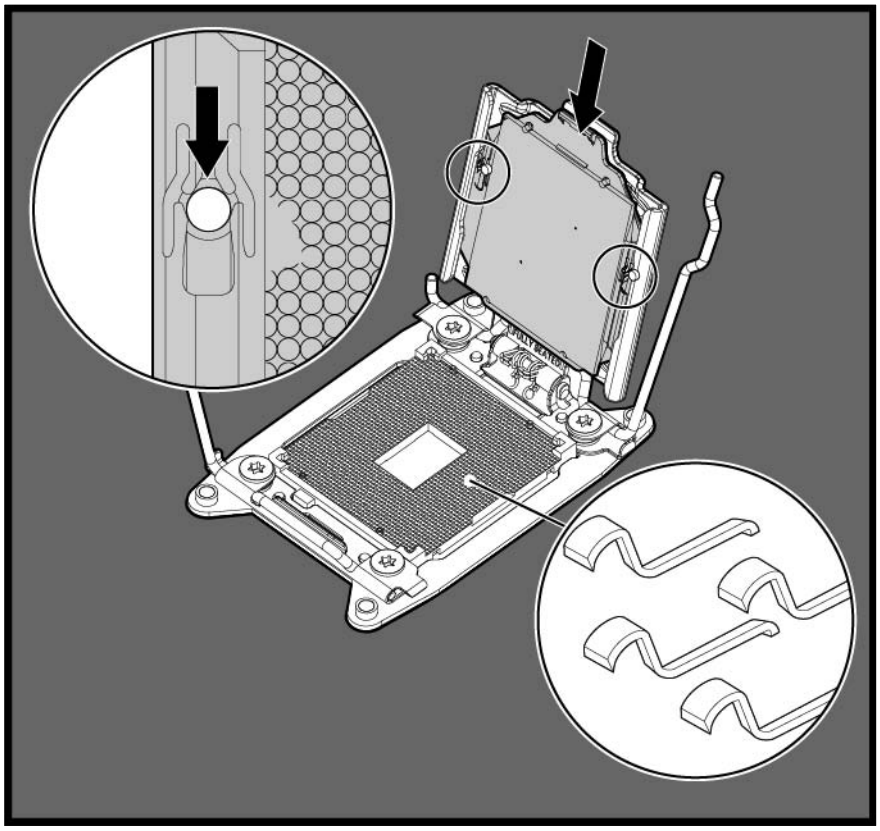
7. Open each of the processor locking levers in the order indicated, and then open the processor retaining bracket.



8. Remove the clear processor socket cover. Retain the processor socket cover for future use.



9. Install the processor. Verify that the processor is fully seated in the processor retaining bracket by visually inspecting the processor installation guides on either side of the processor. **THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED.**

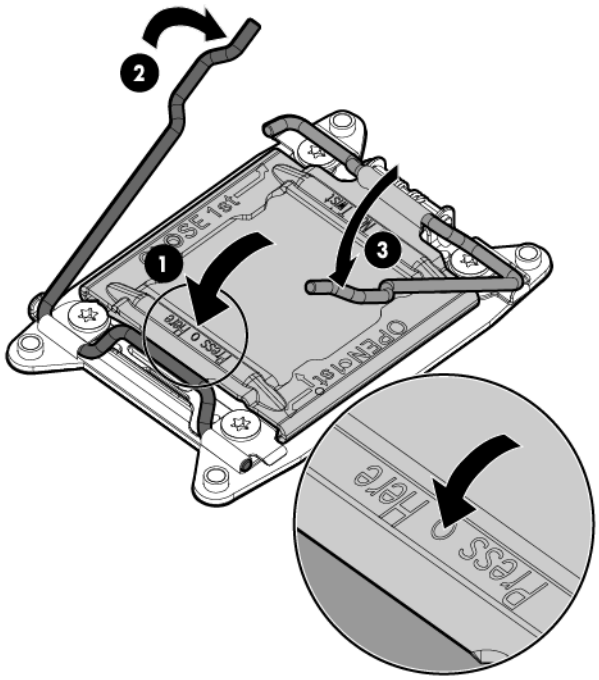


△ **CAUTION: THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED.** To avoid damage to the system board, do not touch the processor or the processor socket contacts.

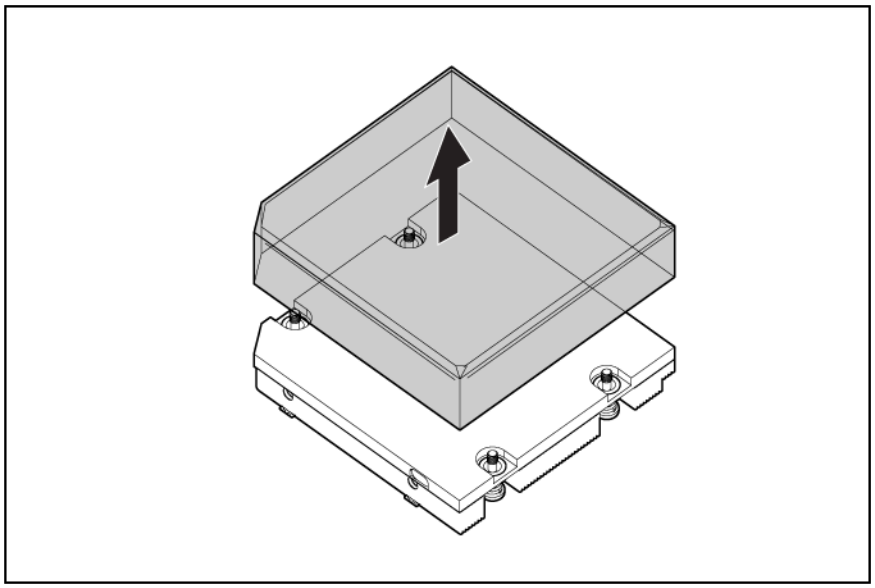
10. Close the processor retaining bracket. When the processor is installed properly inside the processor retaining bracket, the processor retaining bracket clears the flange on the front of the socket.

CAUTION: Do not press down on the processor. Pressing down on the processor may cause damage to the processor socket and the system board. Press only in the area indicated on the processor retaining bracket.

11. Press and hold the processor retaining bracket in place, and then close each processor locking lever. Press only in the area indicated on the processor retaining bracket.

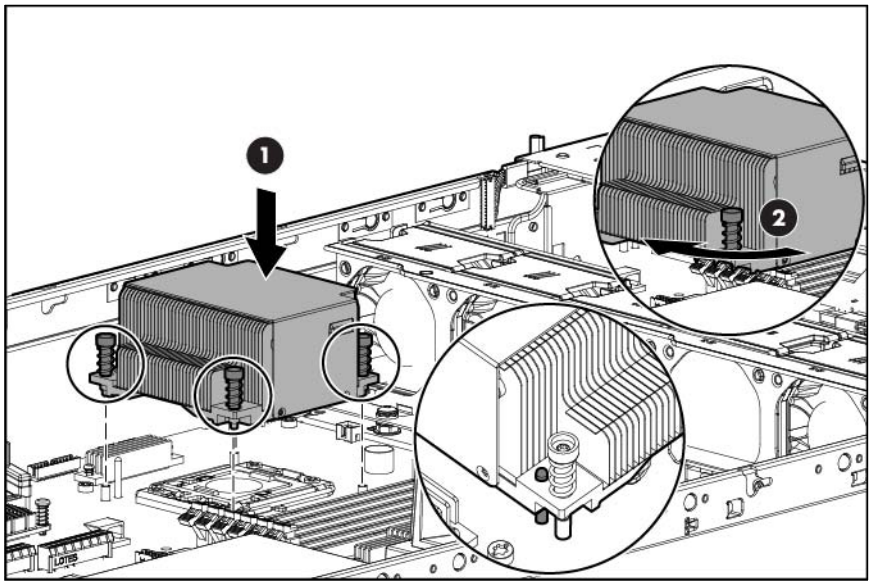


12. Remove the thermal interface protective cover from the heatsink.

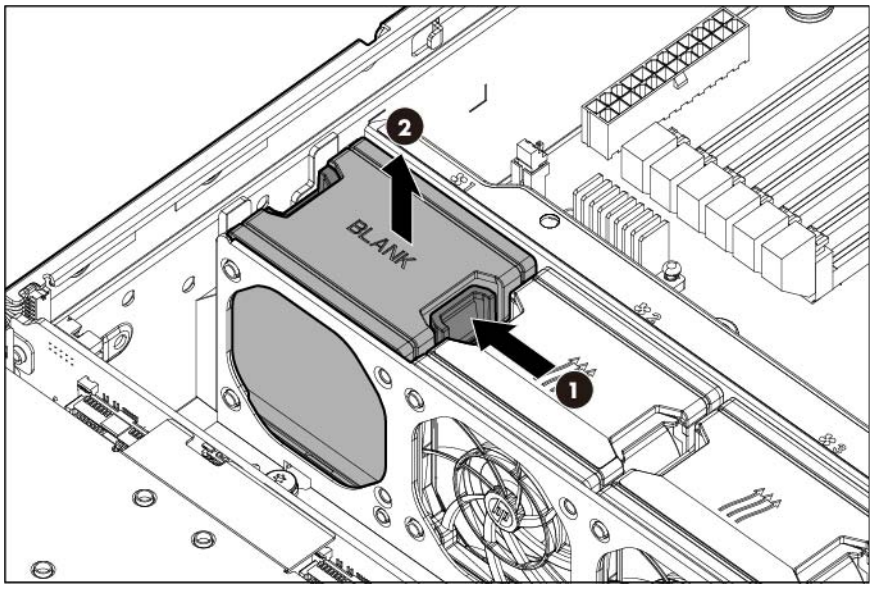


13. Install the heatsink:
    a. Position the heatsink using the guide pin on the processor backplate.
    b. Tighten one pair of diagonally opposite screws halfway, and then tighten the other pair of screws.

c. Finish the installation by completely tightening the screws in the same sequence.

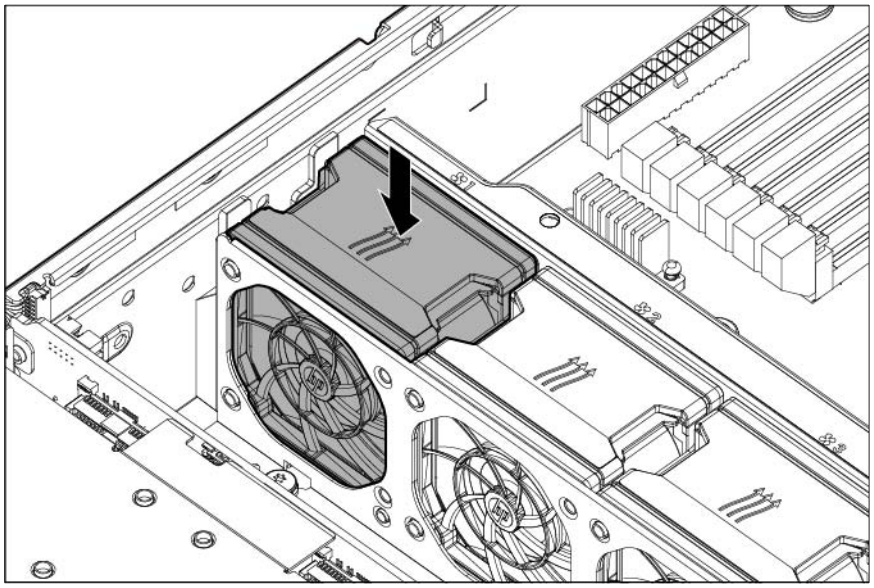


14. Install the fans based on the fan population guidelines ("Fan population guidelines" on page 53).
15. Remove the fan blanks.



16. Install the additional fans included in the processor option kit.

Store any unused fans as spares.



17. Install the air baffle (on page 23).
18. Install the access panel (on page 23).
19. Install the server into the rack ("Installing the server into the rack" on page 32).
20. Power up the server (on page 19).

Expansion board options

The server has both full-height and low-profile expansion slots for controller option installation ("PCIe riser board slot definitions" on page 12).

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

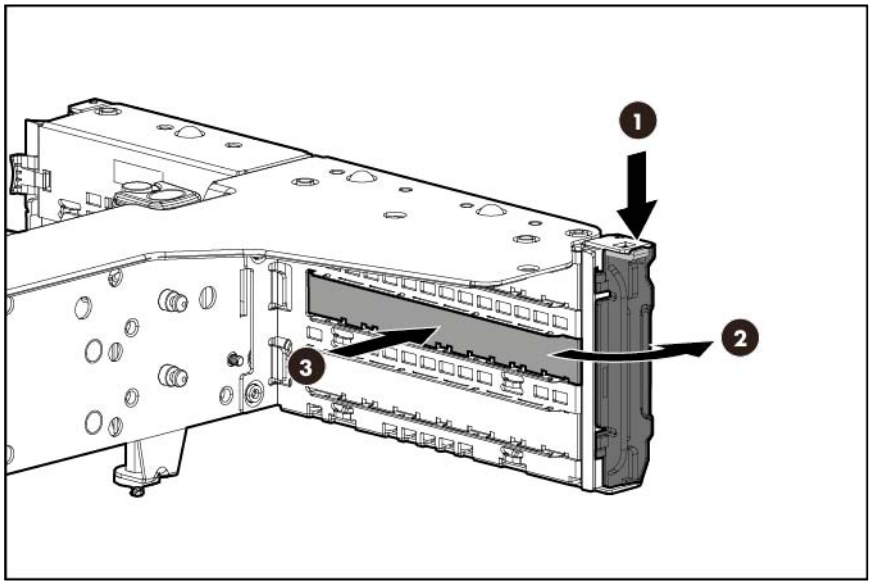
CAUTION: To prevent damage to the server or expansion boards, power down the server, and disconnect all power cords before removing or installing the PCI riser cage.

CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all expansion slots have either an expansion slot cover or an expansion board installed.

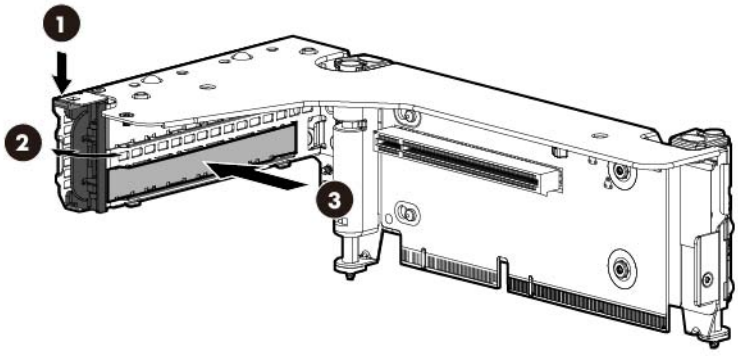
To install the component:

1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   - Extend the server from the rack (on page 19).
   - Remove the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Remove the PCI riser cage ("Remove the PCI riser cages" on page 24).

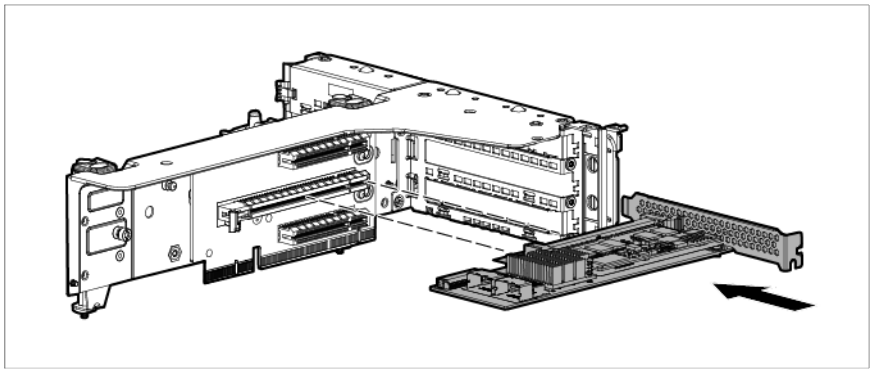
6. Identify the expansion slot compatible with the new option, and then remove the cover for that slot:
   - Primary PCI riser cage



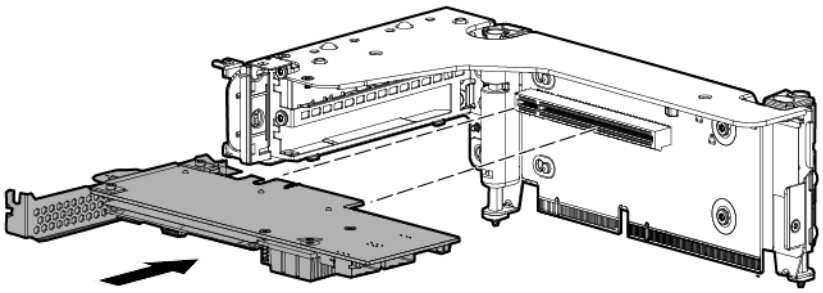
   - Secondary PCI riser cage



7. Verify that any switches or jumpers on the expansion board are set properly. For more information, see the documentation that ships with the option.
8. Install the expansion board:
   - Primary PCI riser cage



- Secondary PCI riser cage



9. Install the PCI riser cage ("Install the PCI riser cages" on page 25).

IMPORTANT: The server does not power up if the PCI riser cage is not seated properly.

10. Connect all necessary internal cabling to the expansion board. For more information on these cabling requirements, see the documentation that ships with the option.
11. Install the access panel (on page 23).
12. Install the server into the rack ("Installing the server into the rack" on page 32).
13. Connect all necessary external cabling to the expansion board. For more information on these cabling requirements, see the documentation that ships with the option.
14. Power up the server (on page 19).

GPU power cable option

Connect the GPU power cable option to support high-power GPUs.

GPU installation is only supported in the 8-drive cage configurations. In these configurations, the server can only support single GPU installation.

Before installing a high-power GPU in the server, be sure that the power supplies support the installation of the option. Because of the high power requirements for the GPU, a 750-W or higher power supply may be required. For more information, see the HP Enterprise Configurator website (http://h30099.www3.hp.com/configurator/).

For more information on estimation of power consumption and proper selection of components, see the HP Power Advisor website (http://www.hp.com/go/hppoweradvisor).

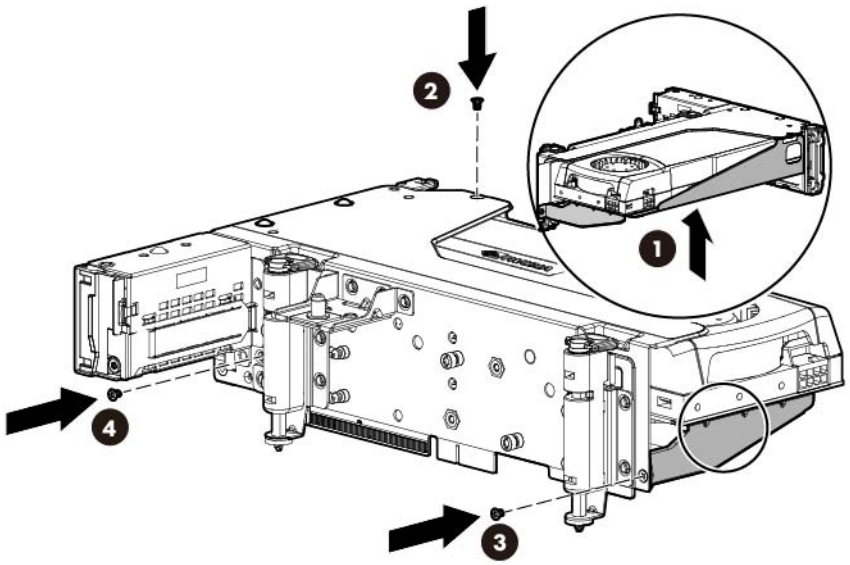
For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

To connect the cable option:

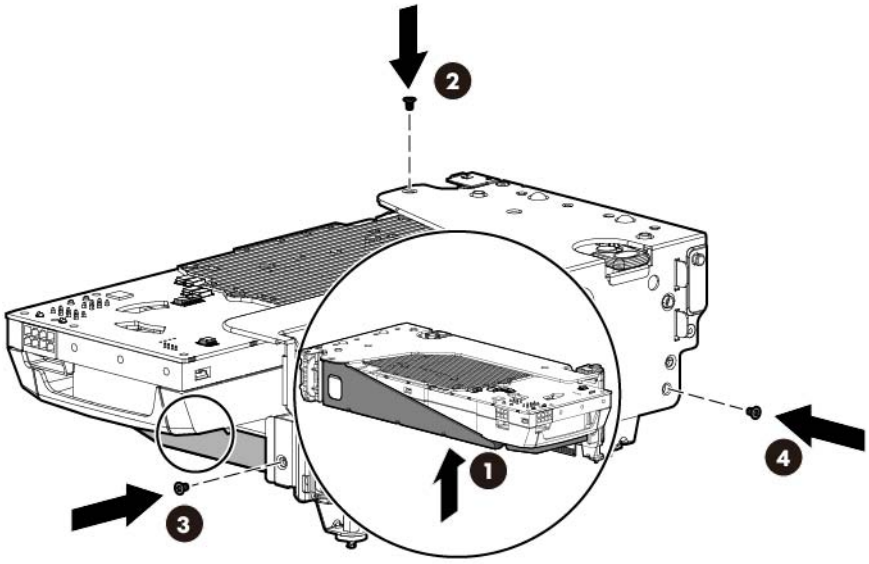
1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:

- Extend the server from the rack (on page 19).
- Remove the server from the rack (on page 21).

4. Remove the access panel (on page 22).
5. Remove the air baffle (on page 23).
6. Do one of the following:
   - Remove the primary PCI riser cage ("Remove the PCI riser cages" on page 24).
   - Remove the secondary PCI riser cage ("Remove the PCI riser cages" on page 24).
7. Install the GPU. For more information, see the documentation that ships with the GPU option.
8. If you are installing a dual-rank GPU, install the GPU retaining bracket:
   - GPU retaining bracket in the primary PCI riser cage

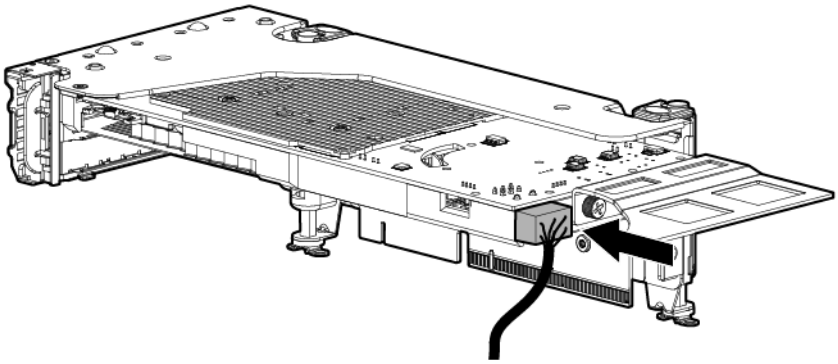


   - GPU retaining bracket in the secondary PCI riser cage

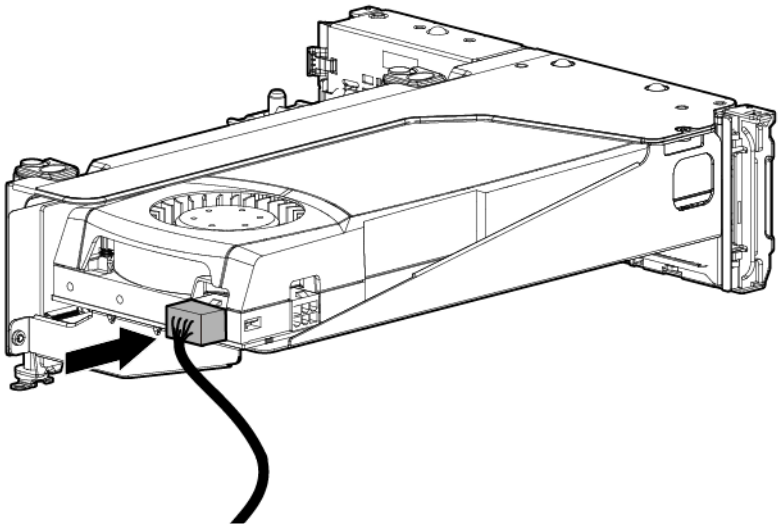


9. Connect the GPU power cable to the GPU:

- Single-rank GPU

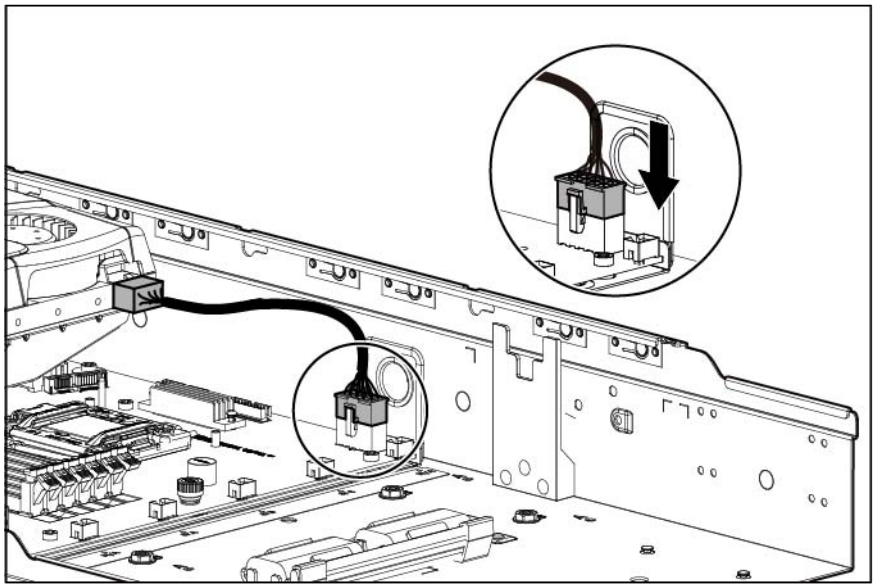


- Dual-rank GPU

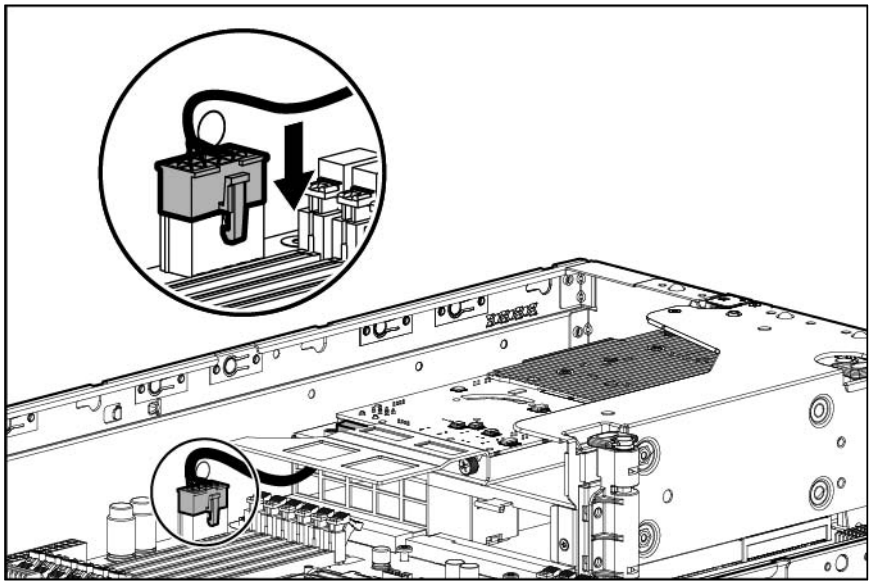


10. Install the PCI riser cage ("Install the PCI riser cages" on page 25).
11. Connect the GPU power cable to the system board ("System board components" on page 12):

- Primary GPU power cabling



- Secondary GPU power cabling



12. Install the air baffle (on page 23).
13. Install the access panel (on page 23).
14. Install the server into the rack ("Installing the server into the rack" on page 32).
15. Power up the server (on page 19).

HP Trusted Platform Module option

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

Use these instructions to install and enable a TPM on a supported server. This procedure includes three sections:

1. Installing the Trusted Platform Module board (on page 76).
2. Retaining the recovery key/password (on page 78).
3. Enabling the Trusted Platform Module (on page 78).

   Enabling the TPM requires accessing RBSU ("HP ROM-Based Setup Utility" on page 102). For more information about RBSU, see the HP website (http://www.hp.com/support/rbsu).

TPM installation requires the use of drive encryption technology, such as the Microsoft Windows BitLocker Drive Encryption feature. For more information on BitLocker, see the Microsoft website (http://www.microsoft.com).

CAUTION: Always observe the guidelines in this document. Failure to follow these guidelines can cause hardware damage or halt data access.

When installing or replacing a TPM, observe the following guidelines:

- Do not remove an installed TPM. Once installed, the TPM becomes a permanent part of the system board.
- When installing or replacing hardware, HP service providers cannot enable the TPM or the encryption technology. For security reasons, only the customer can enable these features.
- When returning a system board for service replacement, do not remove the TPM from the system board. When requested, HP Service provides a TPM with the spare system board.
- Any attempt to remove an installed TPM from the system board breaks or disfigures the TPM security rivet. Upon locating a broken or disfigured rivet on an installed TPM, administrators should consider the system compromised and take appropriate measures to ensure the integrity of the system data.
- When using BitLocker, always retain the recovery key/password. The recovery key/password is required to enter Recovery Mode after BitLocker detects a possible compromise of system integrity.
- HP is not liable for blocked data access caused by improper TPM use. For operating instructions, see the encryption technology feature documentation provided by the operating system.

Installing the Trusted Platform Module board

WARNING: To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

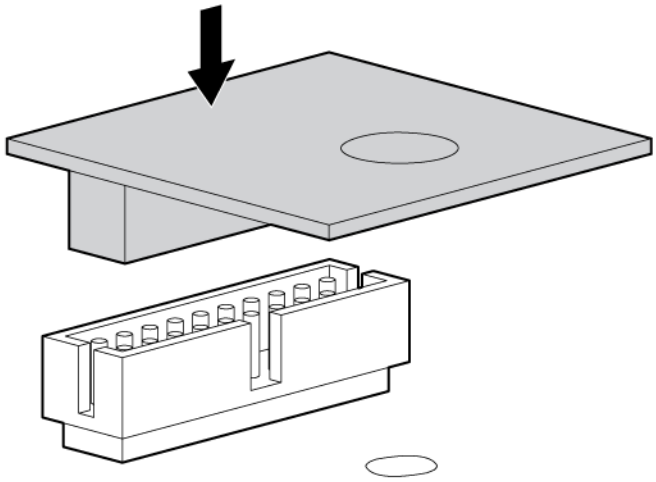
To install the component:

1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   - Extend the server from the rack (on page 19).
   - Remove the server from the rack (on page 21).

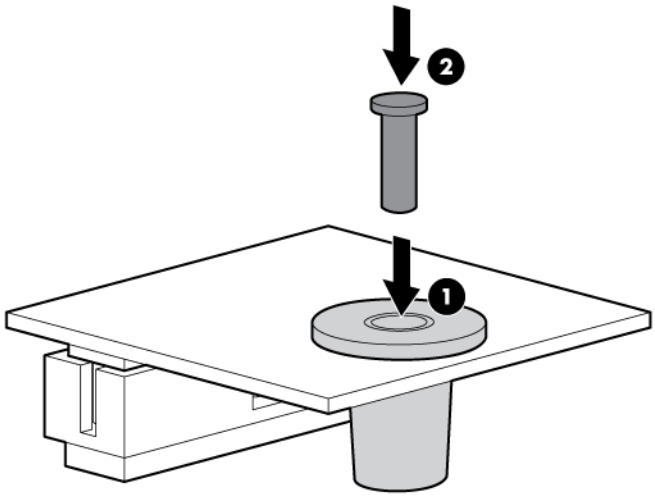
4. Remove the access panel (on page 22).
5. Remove the primary PCI riser cage ("Remove the PCI riser cages" on page 24).

> **CAUTION:** Any attempt to remove an installed TPM from the system board breaks or disfigures the TPM security rivet. Upon locating a broken or disfigured rivet on an installed TPM, administrators should consider the system compromised and take appropriate measures to ensure the integrity of the system data.

6. Install the TPM board. Press down on the connector to seat the board ("System board components" on page 12).



7. Install the TPM security rivet by pressing the rivet firmly into the system board.



8. Install the primary PCI riser cage ("Install the PCI riser cages" on page 25).
9. Install the access panel (on page 23).
10. Install the server into the rack ("Installing the server into the rack" on page 32).
11. Power up the server (on page 19).

Retaining the recovery key/password

The recovery key/password is generated during BitLocker™ setup, and can be saved and printed after BitLocker™ is enabled. When using BitLocker™, always retain the recovery key/password. The recovery key/password is required to enter Recovery Mode after BitLocker™ detects a possible compromise of system integrity.

To help ensure maximum security, observe the following guidelines when retaining the recovery key/password:

- Always store the recovery key/password in multiple locations.
- Always store copies of the recovery key/password away from the server.
- Do not save the recovery key/password on the encrypted hard drive.

Enabling the Trusted Platform Module

1. When prompted during the start-up sequence, access RBSU by pressing the **F9** key.
2. From the Main Menu, select **Server Security**.
3. From the Server Security Menu, select **Trusted Platform Module**.
4. From the Trusted Platform Module Menu, select **TPM Functionality**.
5. Select **Enable**, and then press the **Enter** key to modify the TPM Functionality setting.
6. Press the **Esc** key to exit the current menu, or press the **F10** key to exit RBSU.
7. Reboot the server.
8. Enable the TPM in the OS. For OS-specific instructions, see the OS documentation.

△ **CAUTION:** When a TPM is installed and enabled on the server, data access is locked if you fail to follow the proper procedures for updating the system or option firmware, replacing the system board, replacing a hard drive, or modifying OS application TPM settings.

For more information on firmware updates and hardware procedures, see the *HP Trusted Platform Module Best Practices White Paper* on the HP website (http://www.hp.com/support).

For more information on adjusting TPM usage in BitLocker™, see the Microsoft website (http://technet.microsoft.com/en-us/library/cc732774.aspx).

Redundant hot-plug power supply option

Power redundancy requires the presence of two power supplies in the server.

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

△ **CAUTION:** The default and redundant power supplies in the server must have the same output power capacity. Verify that all power supplies have the same part number and label color. The system becomes unstable and might shut down when it detects mismatched power supplies.

Label color	Output
Blue	460 W
Orange	750 W

Label color	Output
White	750 W -48 VDC
Green	1200 W

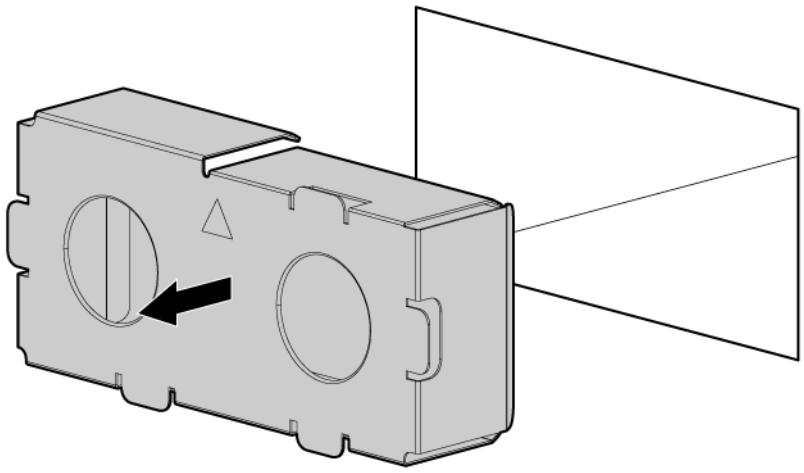
IMPORTANT: The DC power supply unit must only be installed by a qualified technician.

- The 14 AWG green or yellow wire must be fastened to the metal enclosure with a screw and a spring or star washer.
- When installing the DC power supply unit, the ground wire must be connected before the positive or negative leads.

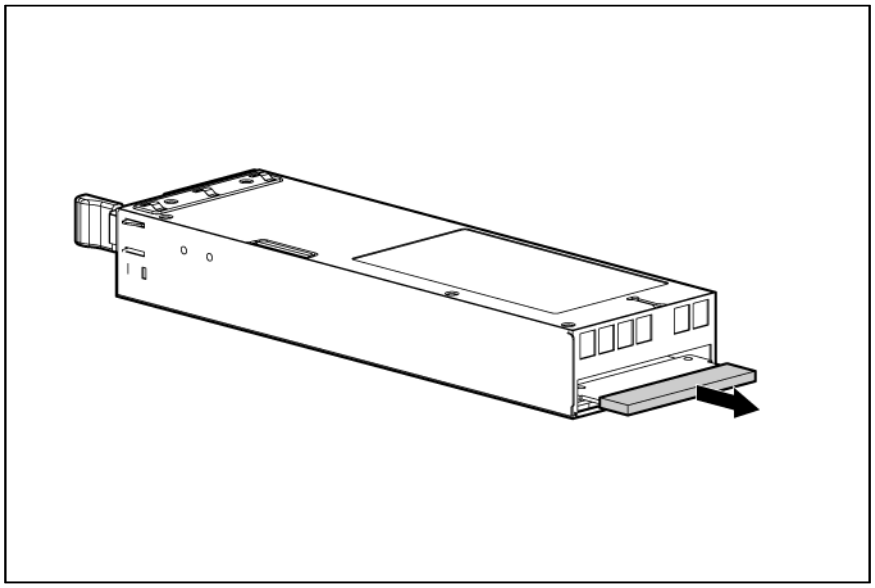
CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

To install the component:

1. Unfasten the cable management solution to access the power supply bays.
2. Remove the EMI shield from the power supply bay.

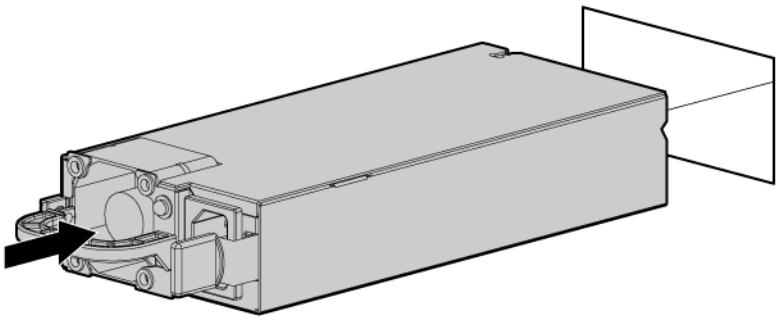


3. Remove the protective cover from the connector pins on the power supply.



⚠ **WARNING:** To reduce the risk of electric shock or damage to the equipment, do not connect the power cord to the power supply until the power supply is installed.

4. Install the power supply into the bay until it clicks.



5. Connect the power cord to the power supply.
6. Route the power cord through the cable management solution.
7. Connect the power cord to the power source.

   Be sure that the power supply LED is green.

Cabling

Cabling overview

This section provides guidelines that help you make informed decisions about cabling the server and hardware options to optimize performance.

For information on cabling peripheral components, refer to the white paper on high-density deployment at the HP website (http://www.hp.com/products/servers/platforms).

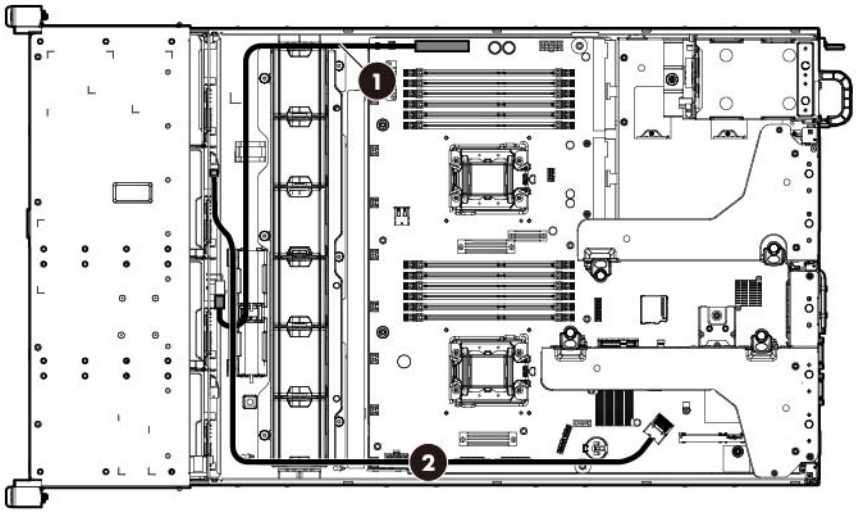
CAUTION: When routing cables, always be sure that the cables are not in a position where they can be pinched or crimped.

Storage cabling

The FBWC solution is a separately purchased option. This server supports FBWC module installation ("Installing the FBWC module and capacitor pack" on page 49) on the system board or on a storage controller.

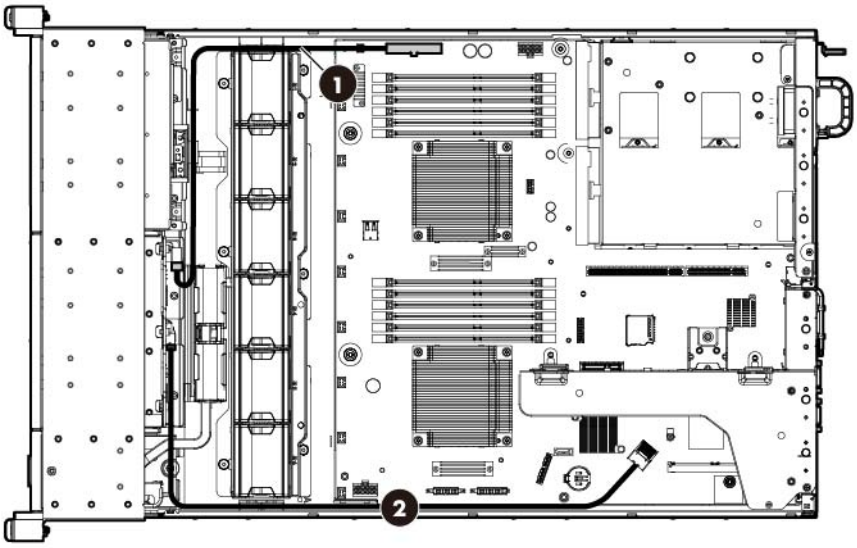
Depending on the controller option installed, the actual storage controller connectors might look different from what is shown in this section.

4 LFF SATA cabling



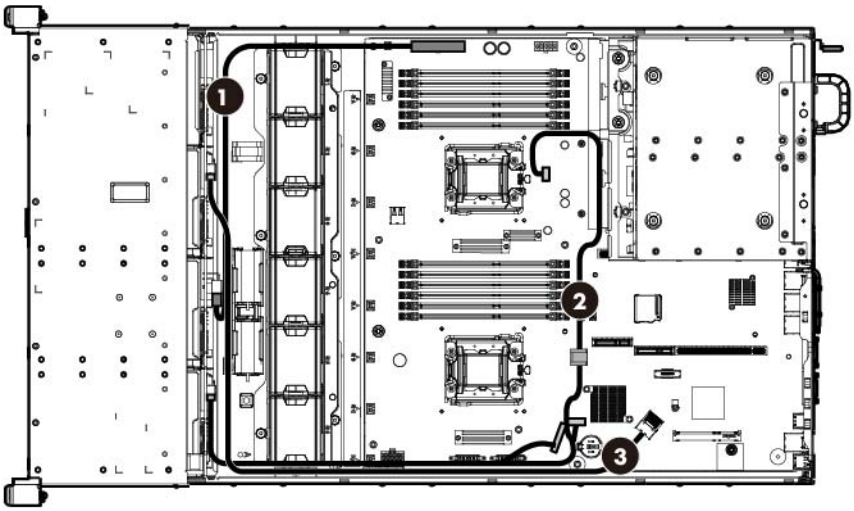
Item	Description
1	Power cable
2	Mini-SAS cable

4 SFF SATA cabling



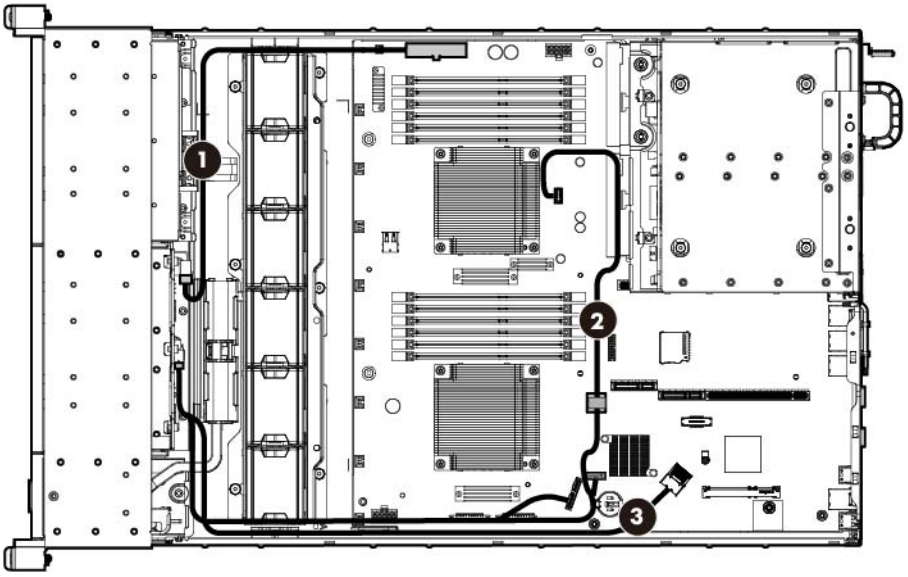
Item	Description
1	Power cable
2	Mini-SAS cable

6 LFF SATA cabling



Item	Description
1	Power cable
2	Two-port SATA cable
3	Mini-SAS cable

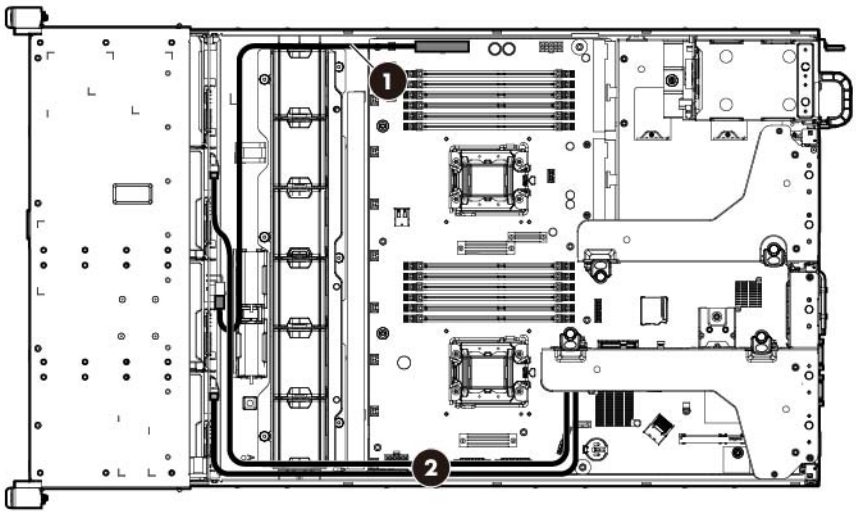
6 SFF SATA cabling



Item	Description
1	Power cable
2	Two-port SATA cable
3	Mini-SAS cable

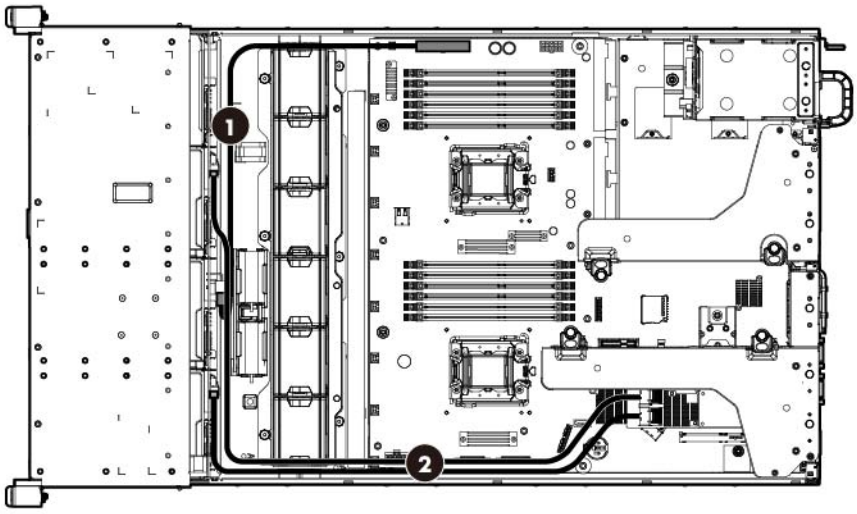
8 LFF cabling

- Mini-SAS cables connected to a riser board with SAS support



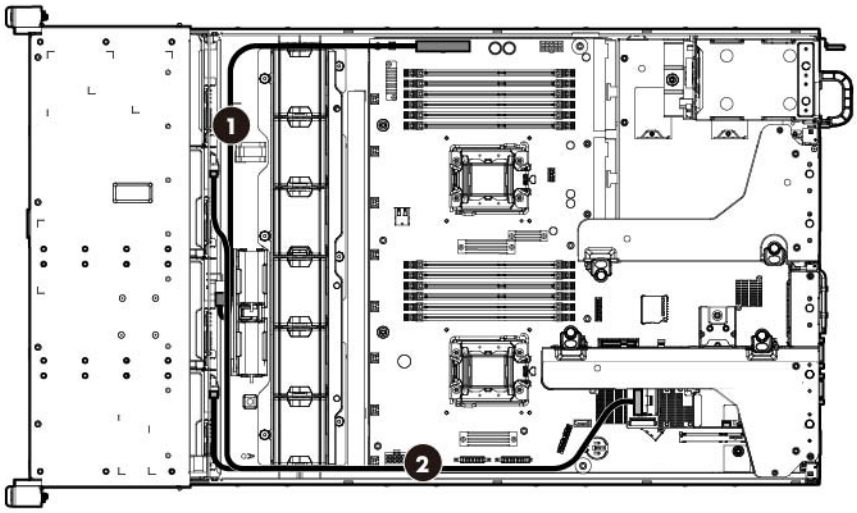
Item	Description
1	Power cable
2	Mini-SAS cables

- Mini-SAS cables connected to a storage controller option



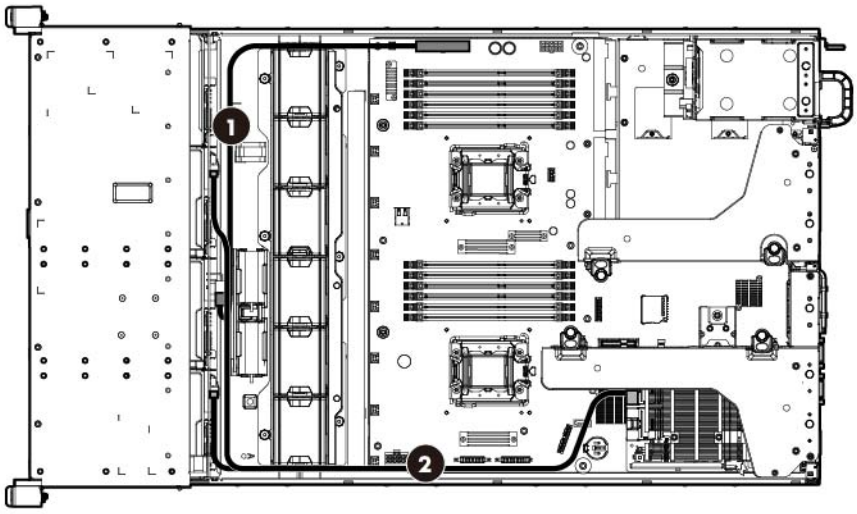
Item	Description
1	Power cable
2	Mini-SAS cables

- Mini-SAS Y-cable connected to the P430 storage controller option



Item	Description
1	Power cable
2	Mini-SAS Y-cable

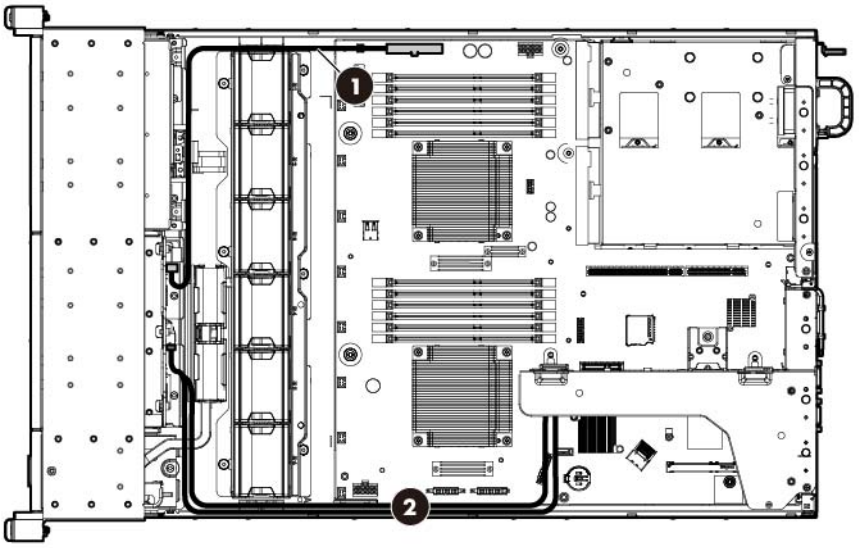
- Mini-SAS Y-cable connected to the P830 storage controller option



Item	Description
1	Power cable
2	Mini-SAS Y-cable

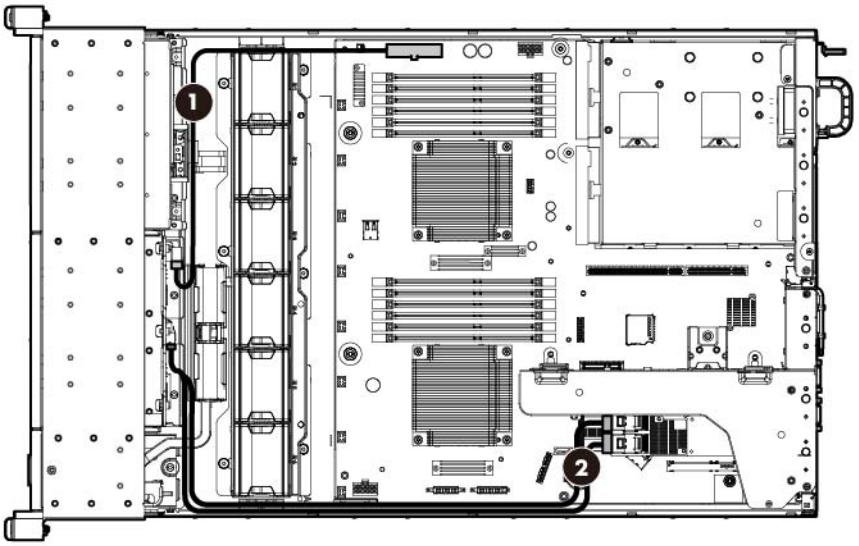
8 SFF cabling

- Mini-SAS cables connected to a riser board with SAS support



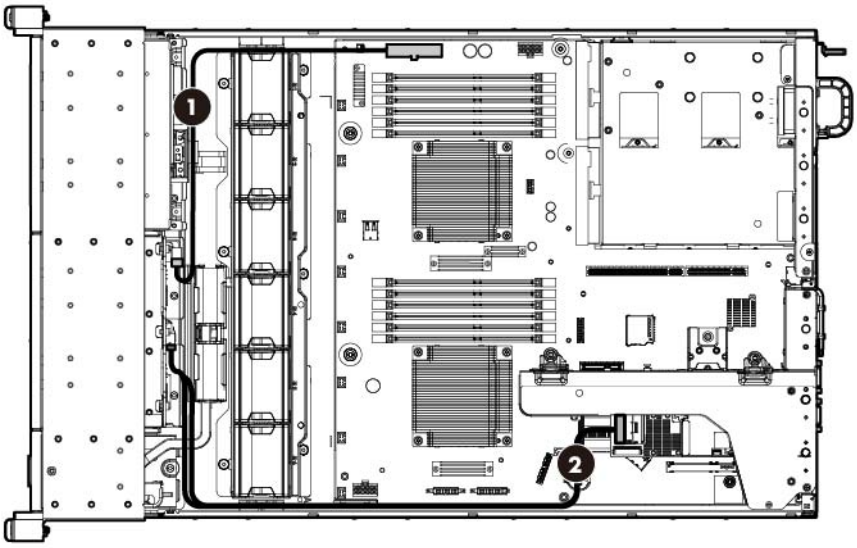
Item	Description
1	Power cable
2	Mini-SAS cables

- Mini-SAS cables connected to a storage controller option



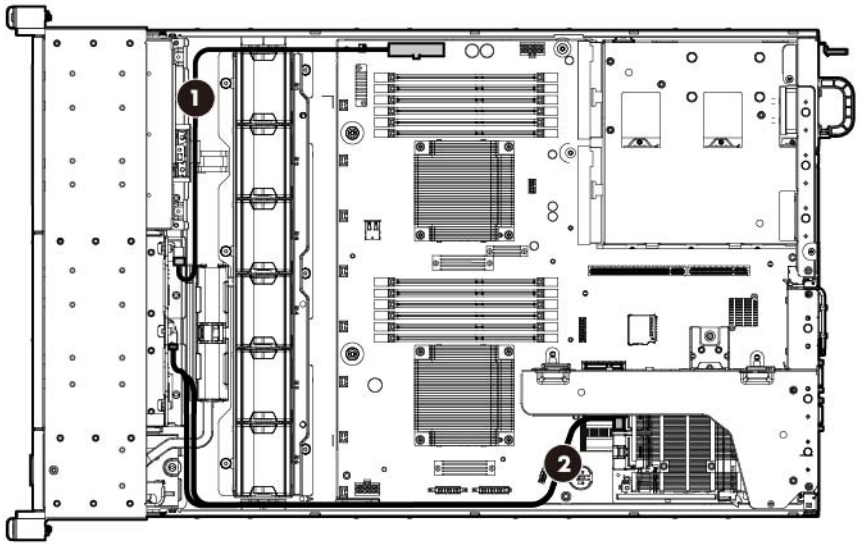
Item	Description
1	Power cable
2	Mini-SAS cables

- Mini-SAS Y-cable connected to the P430 storage controller option



Item	Description
1	Power cable
2	Mini-SAS Y-cable

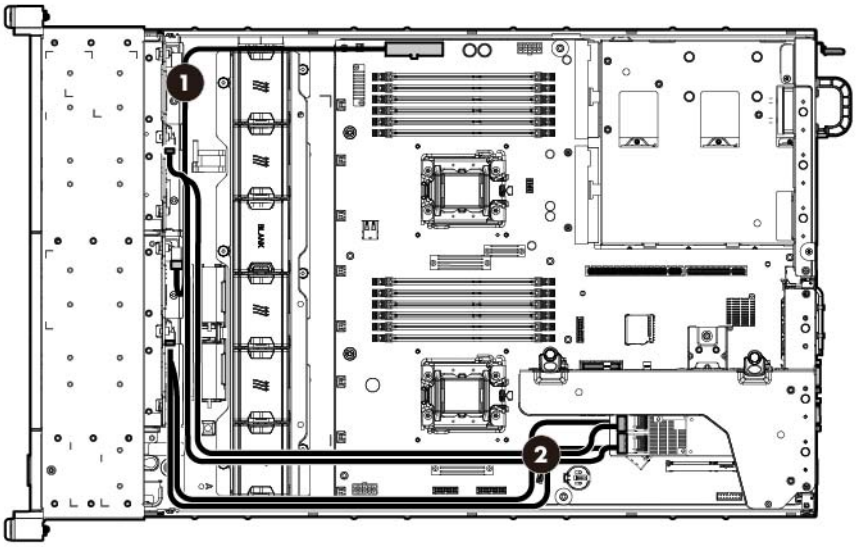
- Mini-SAS Y-cable connected to the P830 storage controller option



Item	Description
1	Power cable
2	Mini-SAS Y-cable

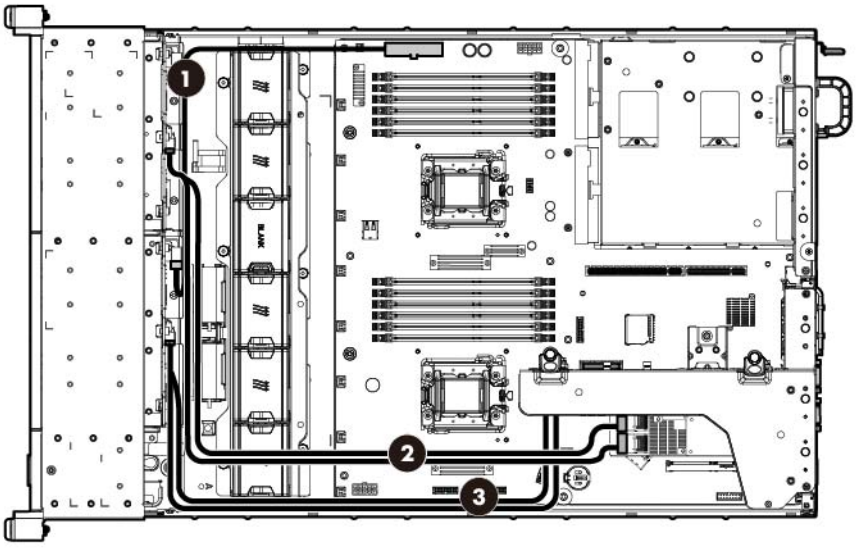
8+8 SFF cabling

- Mini-SAS cables connected to a storage controller option installed in the primary PCI riser cage



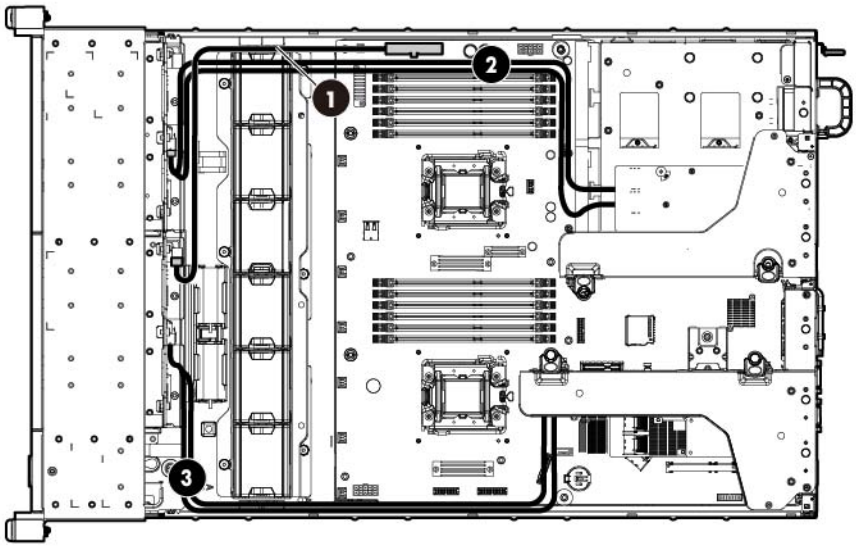
Item	Description
1	Power cable
2	Mini-SAS cables

- Mini-SAS cables connected to a storage controller option and a riser board with SAS support installed in the primary PCI riser cage



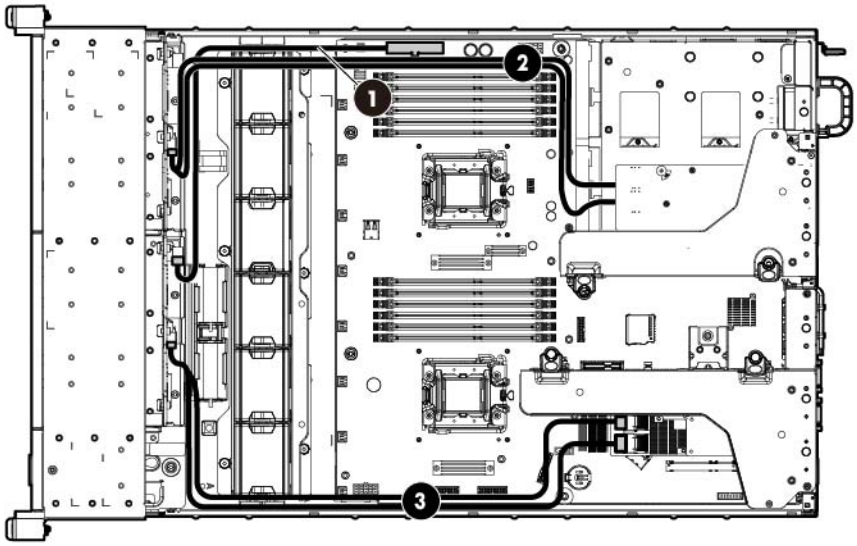
Item	Description
1	Power cable
2	Mini-SAS cables to the storage controller option
3	Mini-SAS cables to a riser board with SAS support

- Mini-SAS cables connected to a storage controller option installed in the secondary PCI riser cage, and a riser board with SAS support installed in the primary PCI riser cage.



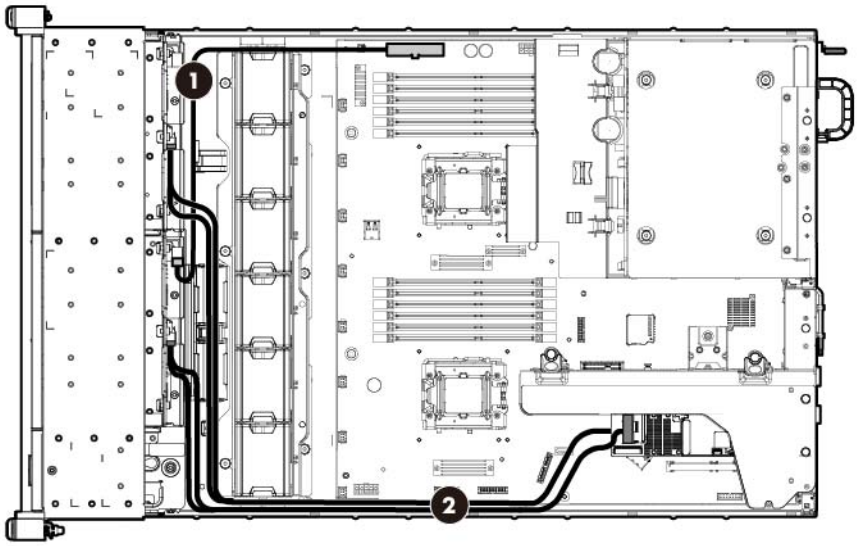
Item	Description
1	Power cable
2	Mini-SAS cables to the storage controller option
3	Mini-SAS cables to the riser board with SAS support

- Mini-SAS cables connected to storage controller options installed in separate PCI riser cages



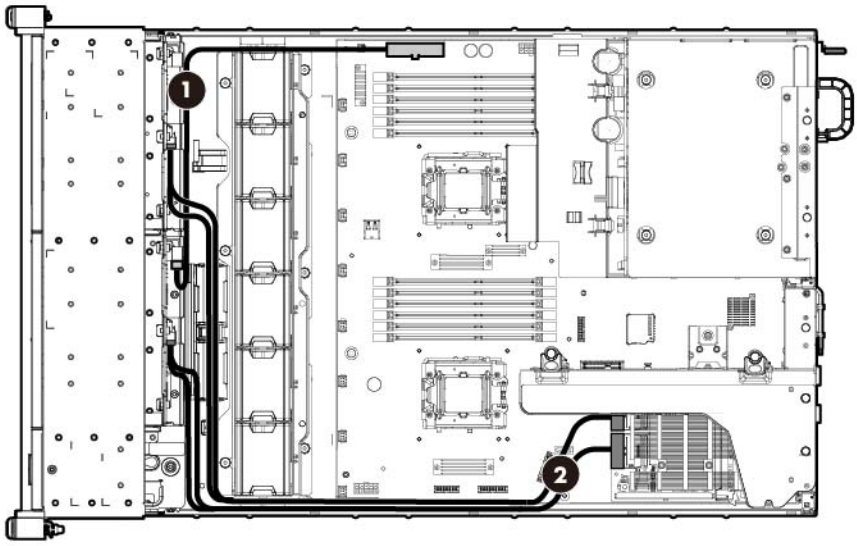
Item	Description
1	Power cable
2	Mini-SAS cables to the secondary PCI riser cage
3	Mini-SAS cables to the primary PCI riser cage

- Mini-SAS Y-cable connected to the P430 storage controller option



Item	Description
1	Power cable
2	Mini-SAS Y-cables

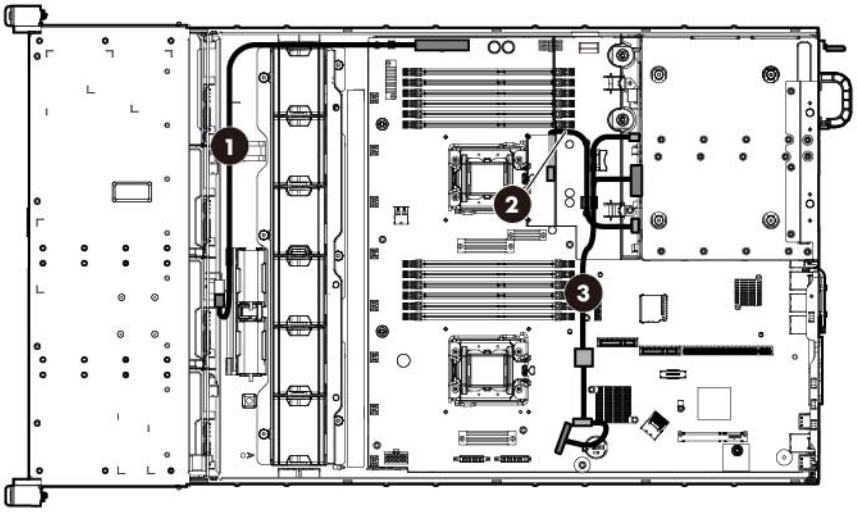
- Mini-SAS Y-cables connected to the P830 storage controller option



Item	Description
1	Power cable
2	Mini-SAS Y-cables

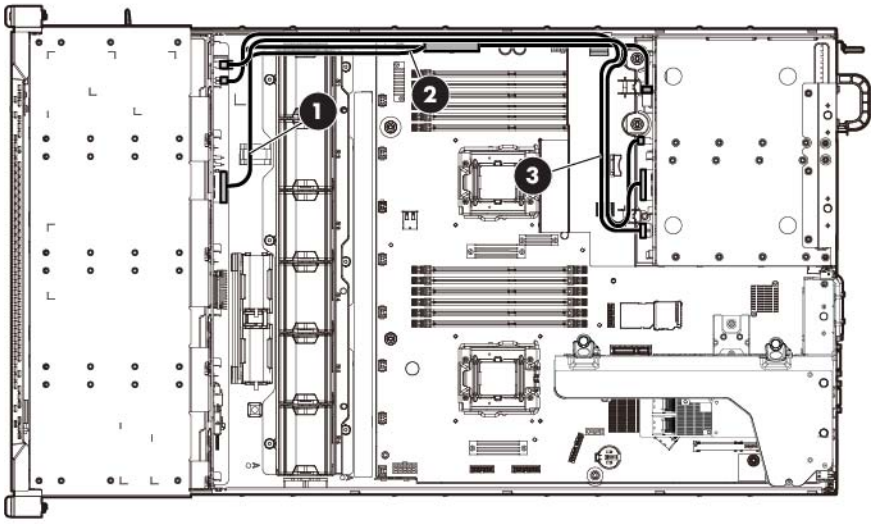
2 LFF rear drive cabling

- Sideband signal and SATA cables connected to the system board



Item	Description
1	Power cable
2	Sideband signal cable
3	SATA cable

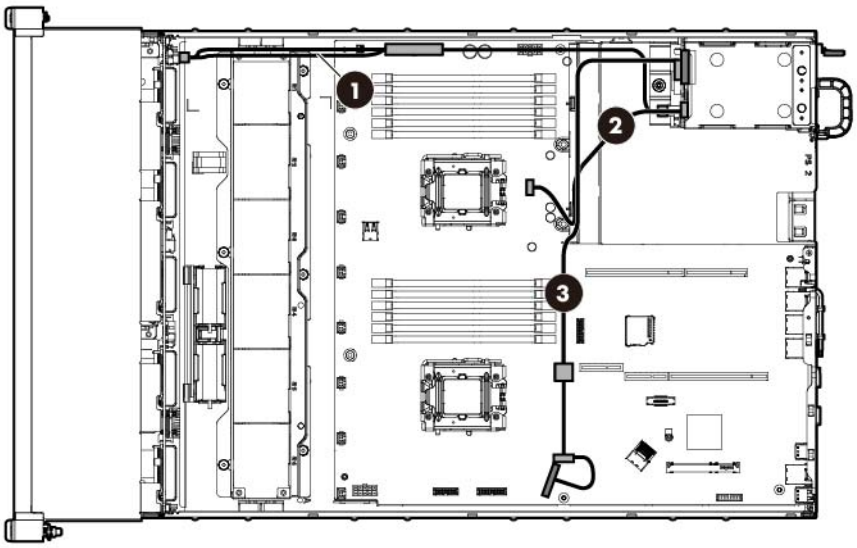
- Sideband signal and SATA cables connected to the expander backplane



Item	Description
1	SATA cable
2	Power cable
3	Sideband signal cable

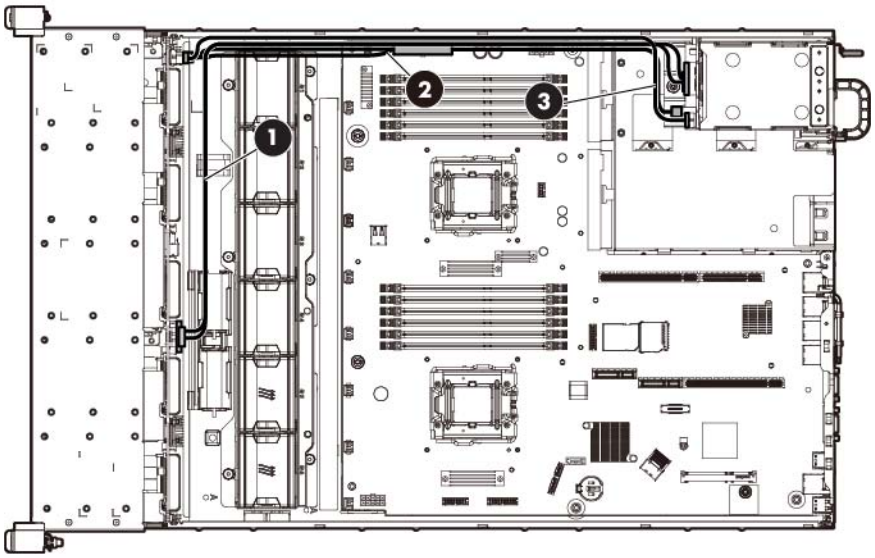
2 SFF rear drive cabling

- Sideband signal and SATA cables connected to the system board



Item	Description
1	Power cable
2	Sideband signal cable
3	SATA cable

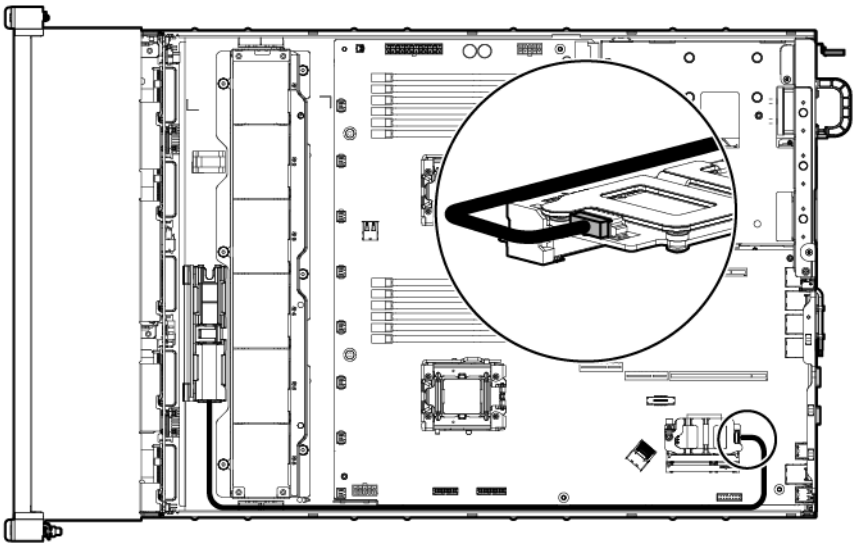
- Sideband signal and SATA cables connected to the expander backplane



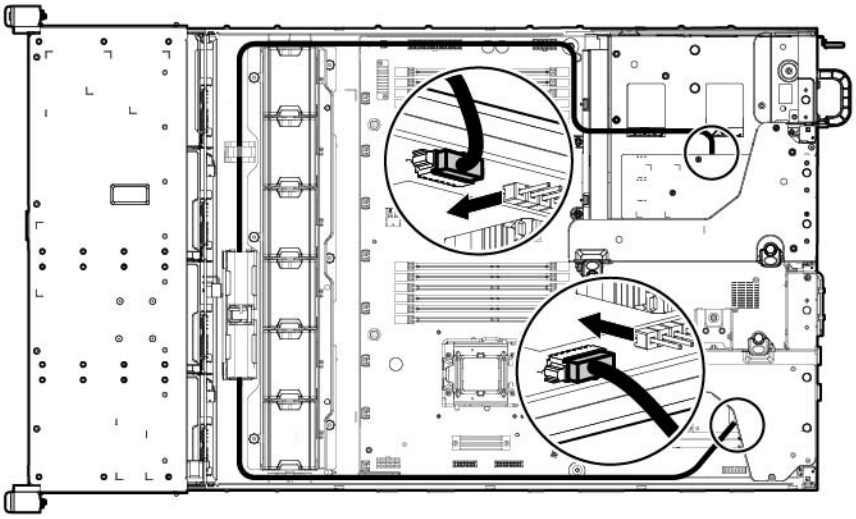
Item	Description
1	SATA cable
2	Power cable
3	Sideband signal cable

Capacitor pack cabling

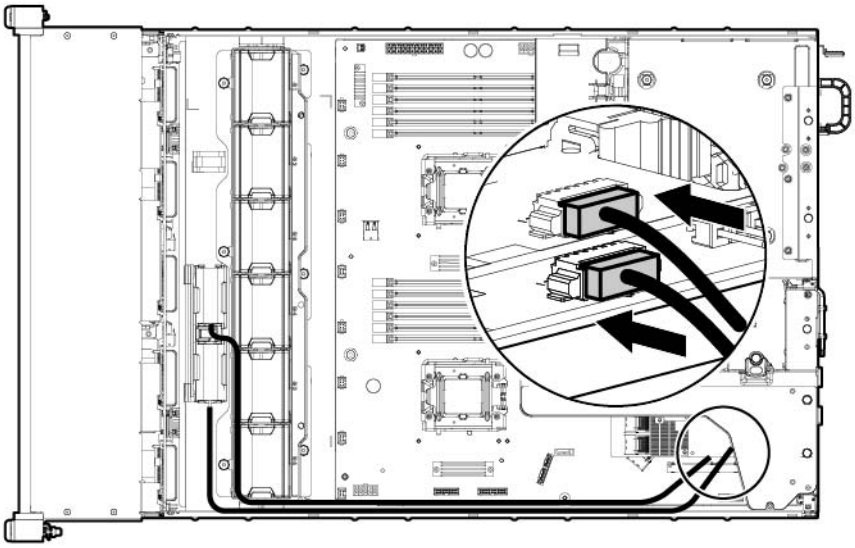
- Capacitor pack connected to a cache module installed on the system board



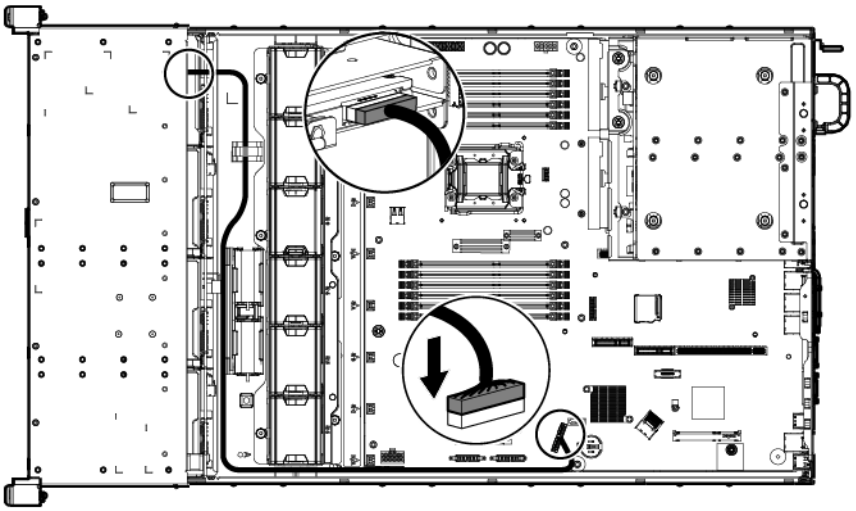
- Capacitor packs connected to cache modules installed in separate storage controllers located in different PCI riser cages



- Capacitor packs connected to cache modules installed in separate storage controllers located in the full-height slots of the primary PCI cage

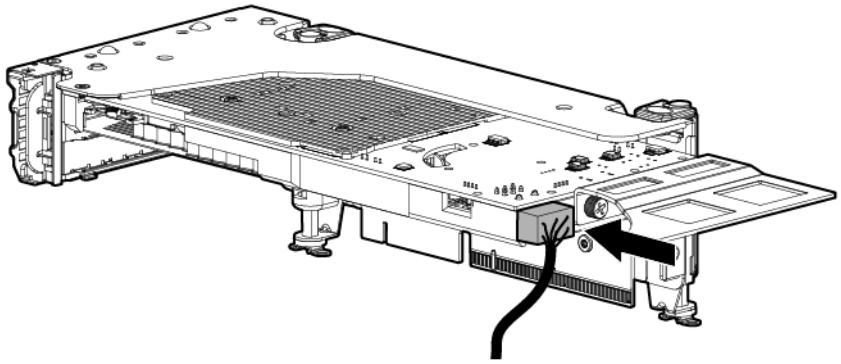


Optical drive cabling

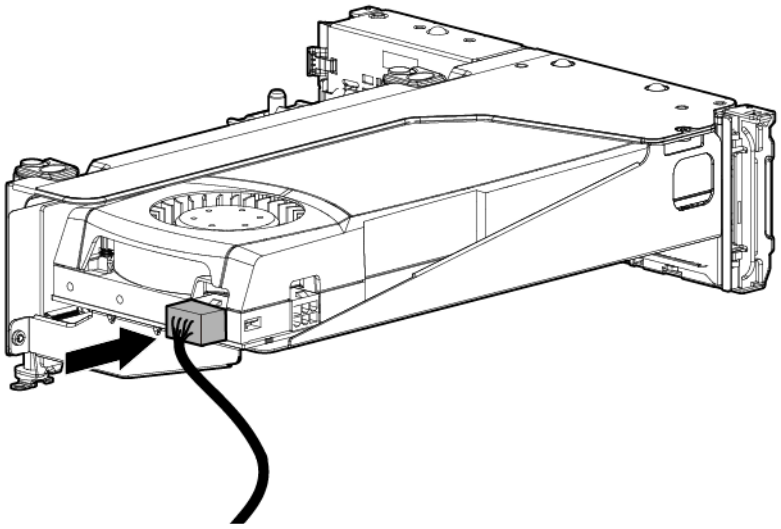


GPU power cabling

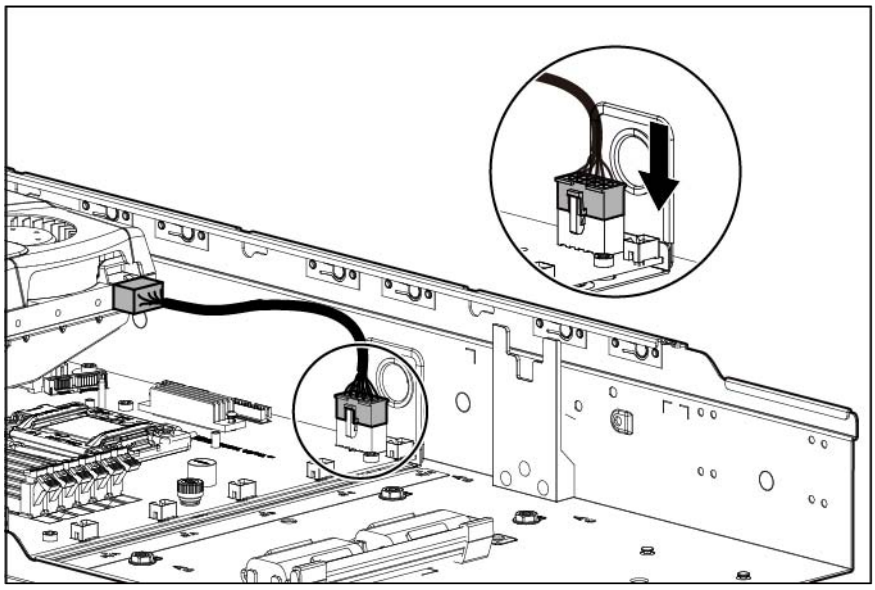
- GPU connection options:
  - Single-rank GPU



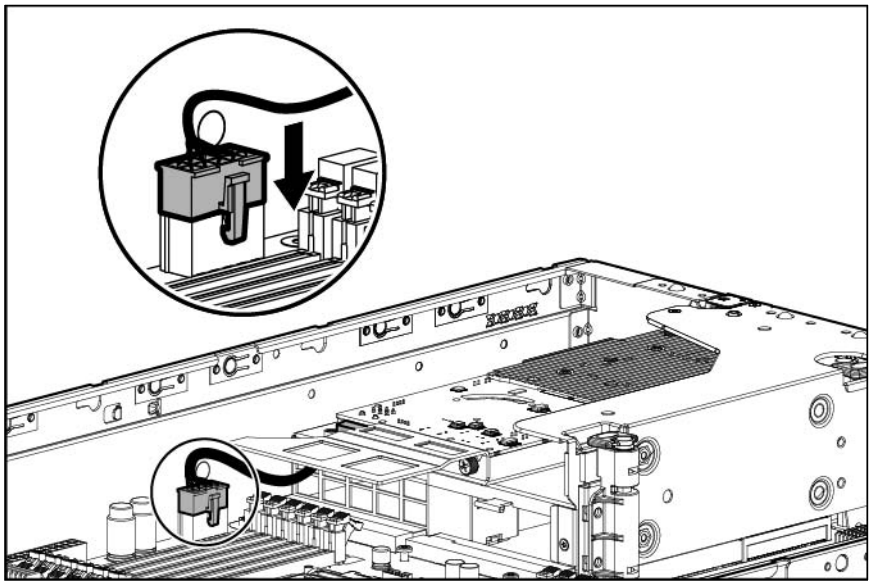
- Dual-rank GPU



- System board connection options:
  - Primary GPU power cabling



- Secondary GPU power cabling



Software and configuration utilities

Server mode

The software and configuration utilities presented in this section operate in online mode, offline mode, or in both modes.

Software or configuration utility	Server mode
HP iLO (on page 97)	Online and Offline
Active Health System (on page 98)	Online and Offline
Integrated Management Log (on page 99)	Online and Offline
Intelligent Provisioning (on page 99)	Offline
HP Insight Diagnostics (on page 100)	Online and Offline
HP Insight Remote Support software (on page 100)	Online
Scripting Toolkit ("Scripting Toolkit for Windows and Linux" on page 102)	Online
HP Service Pack for ProLiant (on page 102)	Online and Offline
HP Smart Update Manager (on page 102)	Online and Offline
HP ROM-Based Setup Utility (on page 102)	Offline
HP Smart Storage Administrator (on page 105)	Online and Offline
Option ROM Configuration for Arrays (on page 105)	Offline
ROMPaq utility (on page 106)	Offline

HP product QuickSpecs

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).

HP iLO Management

HP iLO Management is a set of embedded management features supporting the complete lifecycle of the server, from initial deployment through ongoing management.

HP iLO

The iLO 4 subsystem is a standard component of HP ProLiant servers that simplifies initial server setup, server health monitoring, power and thermal optimization, and remote server administration. The iLO 4 subsystem includes an intelligent microprocessor, secure memory, and a dedicated network interface. This design makes iLO 4 independent of the host server and its operating system.

iLO 4 enables and manages the Active Health System (on page 98) and also features Agentless Management. All key internal subsystems are monitored by iLO 4. SNMP alerts are sent directly by iLO 4 regardless of the host operating system or even if no host operating system is installed.

HP Insight Remote Support software (on page 100) is also available in HP iLO with no operating system software, drivers, or agents.

Using iLO 4, you can do the following:

- Access a high-performance and secure Integrated Remote Console to the server from anywhere in the world if you have a network connection to the server.
- Use the shared iLO 4 Remote Console to collaborate with up to four server administrators.
- Remotely mount high-performance Virtual Media devices to the server.
- Securely and remotely control the power state of the managed server.
- Implement true Agentless Management with SNMP alerts from HP iLO, regardless of the state of the host server.
- Access Active Health System troubleshooting features through the iLO 4 interface.
- Register for HP Insight Remote Support software without installing any drivers or agents.

For more information about iLO 4 features, see the iLO 4 documentation on the Documentation CD or on the HP website (http://www.hp.com/go/ilo/docs).

Active Health System

HP Active Health System provides the following features:

- Combined diagnostics tools/scanners
- Always on, continuous monitoring for increased stability and shorter downtimes
- Rich configuration history
- Health and service alerts
- Easy export and upload to Service and Support

The HP Active Health System monitors and records changes in the server hardware and system configuration. The Active Health System assists in diagnosing problems and delivering rapid resolution when server failures occur.

The Active Health System collects the following types of data:

- Server model
- Serial number
- Processor model and speed
- Storage capacity and speed
- Memory capacity and speed
- Firmware/BIOS

HP Active Health System does not collect information about Active Health System users' operations, finances, customers, employees, partners, or data center, such as IP addresses, host names, user names, and passwords. HP Active Health System does not parse or change operating system data from third-party error event log activities, such as content created or passed through by the operating system.

The data that is collected is managed according to the HP Data Privacy policy. For more information see the HP website (http://www.hp.com/go/privacy).

The Active Health System log, in conjunction with the system monitoring provided by Agentless Management or SNMP Pass-thru, provides continuous monitoring of hardware and configuration changes, system status, and service alerts for various server components.

The Agentless Management Service is available in the SPP, which is a disk image (.iso) that you can download from the HP website (http://www.hp.com/go/spp/download). The Active Health System log can be downloaded manually from iLO 4 or HP Intelligent Provisioning and sent to HP.

For more information, see the following documents:

- *HP iLO User Guide* on the HP website (http://www.hp.com/go/ilo/docs)
- *HP Intelligent Provisioning User Guide* on the HP website (http://www.hp.com/go/intelligentprovisioning/docs)

Integrated Management Log

The IML records hundreds of events and stores them in an easy-to-view form. The IML timestamps each event with 1-minute granularity.

You can view recorded events in the IML in several ways, including the following:

- From within HP SIM
- From within operating system-specific IML viewers
  - For Windows: IML Viewer
  - For Linux: IML Viewer Application
- From within the iLO 4 user interface
- From within HP Insight Diagnostics (on page 100)

Intelligent Provisioning

Several packaging changes have taken place with HP ProLiant Gen8 servers: SmartStart CDs and the Smart Update Firmware DVD no longer ship with these new servers. Instead, the deployment capability is embedded in the server as part of Intelligent Provisioning.

Intelligent Provisioning is a single-server deployment tool embedded in HP ProLiant Gen8 servers that simplifies HP ProLiant server setup, providing a reliable and consistent way to deploy HP ProLiant server configurations:

- Intelligent Provisioning assists with the OS installation process by preparing the system for installing "off-the-shelf" and HP branded versions of leading operating system software and integrating optimized HP ProLiant server support software.
- Intelligent Provisioning provides maintenance-related tasks through Perform Maintenance Options features.
- Intelligent Provisioning provides installation help for Microsoft Windows, Red Hat and SUSE Linux, and VMware operating systems. For specific OS support, see the *HP Intelligent Provisioning Release Notes* on the HP website (http://www.hp.com/go/intelligentprovisioning/docs).

For more information about Intelligent Provisioning software, see the HP website (http://www.hp.com/go/intelligentprovisioning). For Intelligent Provisioning recovery media downloads, see the Resources tab on the HP website (http://www.hp.com/go/ilo). For consolidated drive and firmware update packages, see the HP Systems and Server Software Management page on the HP website (http://www.hp.com/go/SmartUpdate).

HP Insight Diagnostics

HP Insight Diagnostics is a proactive server management tool, available in both offline and online versions, that provides diagnostics and troubleshooting capabilities to assist IT administrators who verify server installations, troubleshoot problems, and perform repair validation.

HP Insight Diagnostics Offline Edition performs various in-depth system and component testing while the OS is not running. To run this utility, boot the server using Intelligent Provisioning (on page 99).

HP Insight Diagnostics Online Edition is a web-based application that captures system configuration and other related data needed for effective server management. Available in Microsoft Windows and Linux versions, the utility helps to ensure proper system operation.

For more information or to download the utility, see the HP website (http://www.hp.com/servers/diags). HP Insight Diagnostics Online Edition is also available in the SPP ("HP Service Pack for ProLiant" on page 102).

HP Insight Diagnostics survey functionality

HP Insight Diagnostics (on page 100) provides survey functionality that gathers critical hardware and software information on ProLiant servers.

This functionality supports operating systems that are supported by the server. For operating systems supported by the server, see the HP website (http://www.hp.com/go/supportos).

If a significant change occurs between data-gathering intervals, the survey function marks the previous information and overwrites the survey data files to reflect the latest changes in the configuration.

Survey functionality is installed with every Intelligent Provisioning-assisted HP Insight Diagnostics installation, or it can be installed through the SPP ("HP Service Pack for ProLiant" on page 102).

Erase Utility

CAUTION: Perform a backup before running the Erase Utility. The utility sets the system to its original factory state, deletes the current hardware configuration information, including array setup and disk partitioning, and erases all connected hard drives completely. Before using this utility, see the instructions in the *HP Intelligent Provisioning User Guide*.

Use the Erase Utility to erase drives and Active Health System logs, and to reset RBSU settings. Run the Erase Utility if you must erase the system for the following reasons:

- You want to install a new operating system on a server with an existing operating system.
- You encounter an error when completing the steps of a factory-installed operating system installation.

To access the Erase Utility, click the Perform Maintenance icon from the Intelligent Provisioning home screen, and then select **Erase**.

For more information about the Erase Utility, see the *HP Intelligent Provisioning User Guide* on the HP website (http://www.hp.com/go/intelligentprovisioning/docs).

HP Insight Remote Support software

HP strongly recommends that you register your device for remote support to enable enhanced delivery of your HP Warranty, HP Care Pack Service, or HP contractual support agreement. HP Insight Remote Support supplements your monitoring continuously to ensure maximum system availability by providing intelligent event diagnosis, and automatic, secure submission of hardware event notifications to HP, which will initiate

a fast and accurate resolution, based on your product's service level. Notifications may be sent to your authorized HP Channel Partner for onsite service, if configured and available in your country.

For more information, see *HP Insight Remote Support and Insight Online Setup Guide for ProLiant Gen8 Servers and BladeSystem c-Class Enclosures* on the HP website (http://www.hp.com/go/enterprise/docs). HP Insight Remote Support is available as part of HP Warranty, HP Care Pack Service, or HP contractual support agreement.

HP Insight Remote Support Central Connect

When you use the embedded Remote Support functionality with an HP ProLiant Gen8 server or HP BladeSystem c-Class enclosure, you can register a server or enclosure to communicate to HP through an HP Insight Remote Support centralized Hosting Device in your local environment. All configuration and service event information is routed through the Hosting Device. This information can be viewed by using the local HP Insight Remote Support user interface or the web-based view in HP Insight Online.

The Central Connect Remote Support configuration is available in iLO 4 1.10 and later, Intelligent Provisioning 1.20 and later, and Onboard Administrator 3.60 and later.

For more information about the prerequisites, supported hardware, and associated operating systems for central connect, see *HP Insight Remote Support Release Notes* on the HP website (http://www.hp.com/go/insightremotesupport/docs).

HP Insight Remote Support Direct Connect

When you use the embedded Remote Support functionality with a ProLiant Gen8 server or BladeSystem c-Class enclosure, you can register a server or enclosure to communicate directly to HP Insight Online without the need to set up an HP Insight Remote Support centralized Hosting Device in your local environment. HP Insight Online will be your primary interface for remote support information. The Direct Connect Remote Support configuration is available in iLO 4 1.40 and later, Intelligent Provisioning 1.60 and later, and Onboard Administrator 4.10 and later.

For more information, see the product documentation on the HP website (http://www.hp.com/go/insightremotesupport/docs).

HP Insight Online

HP Insight Online is a capability of the HP Support Center portal. Combined with HP Insight Remote Support 7.x, it automatically aggregates device health, asset, and support information from iLO Management with contract and warranty information, and then secures it in a single, personalized dashboard that is viewable from anywhere at any time. The dashboard organizes your IT and service data to help you understand and respond to that information more quickly. With specific authorization from you, an authorized HP Channel Partner can also view your IT environment remotely at HP Insight Online.

For more information, see the following documents:

- For more information about using HP Insight Online, see the *HP Insight Online User's Guide*.
- For more information about installing HP Insight Remote Support and enabling HP Insight Online, see the *HP Insight Remote Support and Insight Online Setup Guide for ProLiant Gen8 Servers and BladeSystem c-Class Enclosures*.

These documents are available on the HP website (http://www.hp.com/go/insightremotesupport/docs).

Scripting Toolkit for Windows and Linux

The Scripting Toolkit for Windows and Linux is a server deployment product that delivers an unattended automated installation for high-volume server deployments. The Scripting Toolkit is designed to support ProLiant BL, ML, DL, and SL servers. The toolkit includes a modular set of utilities and important documentation that describes how to apply these tools to build an automated server deployment process.

The Scripting Toolkit provides a flexible way to create standard server configuration scripts. These scripts are used to automate many of the manual steps in the server configuration process. This automated server configuration process cuts time from each deployment, making it possible to scale rapid, high-volume server deployments.

For more information, and to download the Scripting Toolkit, see the HP website (http://www.hp.com/go/ProLiant/STK).

HP Service Pack for ProLiant

SPP is a comprehensive systems software (drivers and firmware) solution delivered as a single ISO file with major server releases. This solution uses HP SUM as the deployment tool and is tested on all supported HP ProLiant servers including HP ProLiant Gen8 servers.

SPP can be used in an online mode on a Windows or Linux hosted operating system, or in an offline mode where the server is booted to an operating system included on the ISO file so that the server can be updated automatically with no user interaction or updated in interactive mode.

For more information or to download SPP, see one of the following pages on the HP website:

- HP Service Pack for ProLiant download page (http://www.hp.com/go/spp)
- HP Systems and Server Software Management page (http://www.hp.com/go/SmartUpdate)

HP Smart Update Manager

HP SUM is a product used to install and update firmware, drivers, and systems software on HP ProLiant servers. HP SUM provides a GUI and a command-line scriptable interface for deployment of systems software for single or one-to-many HP ProLiant servers and network-based targets, such as iLOs, OAs, and VC Ethernet and Fibre Channel modules.

For more information about HP SUM, see the product page on the HP website (http://www.hp.com/go/hpsum).

To download HP SUM, see the HP website (http://www.hp.com/go/hpsum/download).

To access the *HP Smart Update Manager User Guide*, see the HP SUM Information Library (http://www.hp.com/go/hpsum/documentation).

HP ROM-Based Setup Utility

RBSU is a configuration utility embedded in HP ProLiant servers that performs a wide range of configuration activities that can include the following:

- Configuring system devices and installed options
- Enabling and disabling system features

- Displaying system information
- Selecting the primary boot controller
- Configuring memory options
- Language selection

For more information on RBSU, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP RBSU Information Library (http://www.hp.com/go/rbsu/docs).

Using RBSU

To use RBSU, use the following keys:

- To access RBSU, press the **F9** key during power-up when prompted.
- To navigate the menu system, use the arrow keys.
- To make selections, press the **Enter** key.
- To access Help for a highlighted configuration option, press the **F1** key.

IMPORTANT: RBSU automatically saves settings when you press the **Enter** key. The utility does not prompt you for confirmation of settings before you exit the utility. To change a selected setting, you must select a different setting and press the **Enter** key.

Default configuration settings are applied to the server at one of the following times:

- Upon the first system power-up
- After defaults have been restored

Default configuration settings are sufficient for proper typical server operation, but configuration settings can be modified using RBSU. The system will prompt you for access to RBSU with each power-up.

Auto-configuration process

The auto-configuration process automatically runs when you boot the server for the first time. During the power-up sequence, the system ROM automatically configures the entire system without needing any intervention. During this process, the ORCA utility, in most cases, automatically configures the array to a default setting based on the number of drives connected to the server.

NOTE: If the boot drive is not empty or has been written to in the past, ORCA does not automatically configure the array. You must run ORCA to configure the array settings.

NOTE: The server may not support all the following examples.

Drives installed	Drives used	RAID level
1	1	RAID 0
2	2	RAID 1
3, 4, 5, or 6	3, 4, 5, or 6	RAID 5
More than 6	0	None

To change any ORCA default settings and override the auto-configuration process, press the **F8** key when prompted.

For more information on RBSU, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP RBSU Information Library (http://www.hp.com/go/rbsu/docs).

Boot options

Near the end of the boot process, the boot options screen is displayed. This screen is visible for several seconds before the system attempts to boot from a supported boot device. During this time, you can do the following:

- Access RBSU by pressing the **F9** key.
- Access Intelligent Provisioning Maintenance Menu by pressing the **F10** key.
- Access the boot menu by pressing the **F11** key.
- Force a PXE Network boot by pressing the **F12** key.

Configuring AMP modes

Not all HP ProLiant servers support all AMP modes. RBSU provides menu options only for the modes supported by the server. Advanced memory protection within RBSU enables the following advanced memory modes:

- Advanced ECC Mode—Provides memory protection beyond Standard ECC. All single-bit failures and some multi-bit failures can be corrected without resulting in system downtime.
- Online Spare Mode—Provides protection against failing or degraded DIMMs. Certain memory is set aside as spare, and automatic failover to spare memory occurs when the system detects a degraded DIMM. DIMMs that are likely to receive a fatal or uncorrectable memory error are removed from operation automatically, resulting in less system downtime.

For DIMM population requirements, see the server-specific user guide.

Re-entering the server serial number and product ID

After you replace the system board, you must re-enter the server serial number and the product ID.

1. During the server startup sequence, press the **F9** key to access RBSU.
2. Select the **Advanced Options** menu.
3. Select **Service Options**.
4. Select **Serial Number**. The following warning appears:

   ```
   Warning: The serial number should ONLY be modified by qualified service
   personnel. This value should always match the serial number located on the
   chassis.
   ```
5. Press the **Enter** key to clear the warning.
6. Enter the serial number and press the **Enter** key.
7. Select **Product ID**. The following warning appears:

   ```
   Warning: The Product ID should ONLY be modified by qualified service
   personnel. This value should always match the Product ID located on the
   chassis.
   ```
8. Enter the product ID and press the **Enter** key.
9. Press the **Esc** key to close the menu.

10. Press the **Esc** key to exit RBSU.
11. Press the **F10** key to confirm exiting RBSU. The server automatically reboots.

Utilities and features

HP Smart Storage Administrator

HP SSA is a configuration and management tool for HP Smart Array controllers. Starting with HP ProLiant Gen8 servers, HP SSA replaces ACU with an enhanced GUI and additional configuration features.

HP SSA exists in three interface formats: the HP SSA GUI, the HP SSA CLI, and HP SSA Scripting. Although all formats provide support for configuration tasks, some of the advanced tasks are available in only one format.

Some HP SSA features include the following:

- Supports online array capacity expansion, logical drive extension, assignment of online spares, and RAID or stripe size migration
- Suggests the optimal configuration for an unconfigured system
- Provides diagnostic and SmartSSD Wear Gauge functionality on the Diagnostics tab
- For supported controllers, provides access to additional features.

For more information about HP SSA, see the HP website (http://www.hp.com/go/hpssa).

Option ROM Configuration for Arrays

Before installing an operating system, you can use the ORCA utility to create the first logical drive, assign RAID levels, and establish online spare configurations.

The utility also provides support for the following functions:

- Reconfiguring one or more logical drives
- Viewing the current logical drive configuration
- Deleting a logical drive configuration
- Setting the controller to be the boot controller
- Selecting the boot volume

If you do not use the utility, ORCA will default to the standard configuration.

For more information regarding the default configurations that ORCA uses, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP RBSU Information Library (http://www.hp.com/go/rbsu/docs).

For more information about the storage controller and its features, select the relevant controller user documentation on the HP website (http://www.hp.com/go/smartstorage/docs).

To configure arrays, see the *HP Smart Storage Administrator User Guide* on the HP website (http://www.hp.com/go/smartstorage/docs).

ROMPaq utility

The ROMPaq utility enables you to upgrade the system firmware (BIOS). To upgrade the firmware, insert a ROMPaq USB Key into an available USB port and boot the system. In addition to ROMPaq, Online Flash Components for Windows and Linux operating systems are available for updating the system firmware.

The ROMPaq utility checks the system and provides a choice (if more than one exists) of available firmware revisions.

For more information, go to the HP website (http://www.hp.com/go/hpsc) and click on **Drivers, Software & Firmware**. Then, enter your product name in the **Find an HP product** field and click **Go**.

Automatic Server Recovery

ASR is a feature that causes the system to restart when a catastrophic operating system error occurs, such as a blue screen, ABEND (does not apply to HP ProLiant DL980 Servers), or panic. A system fail-safe timer, the ASR timer, starts when the System Management driver, also known as the Health Driver, is loaded. When the operating system is functioning properly, the system periodically resets the timer. However, when the operating system fails, the timer expires and restarts the server.

ASR increases server availability by restarting the server within a specified time after a system hang. At the same time, the HP SIM console notifies you by sending a message to a designated pager number that ASR has restarted the system. You can disable ASR from the System Management Homepage or through RBSU.

USB support

HP provides both standard USB 2.0 support and legacy USB 2.0 support. Standard support is provided by the OS through the appropriate USB device drivers. Before the OS loads, HP provides support for USB devices through legacy USB support, which is enabled by default in the system ROM.

Legacy USB support provides USB functionality in environments where USB support is not available normally. Specifically, HP provides legacy USB functionality for the following:

- POST
- RBSU
- Diagnostics
- DOS
- Operating environments which do not provide native USB support

Redundant ROM support

The server enables you to upgrade or configure the ROM safely with redundant ROM support. The server has a single ROM that acts as two separate ROM images. In the standard implementation, one side of the ROM contains the current ROM program version, while the other side of the ROM contains a backup version.

NOTE: The server ships with the same version programmed on each side of the ROM.

Safety and security benefits

When you flash the system ROM, ROMPaq writes over the backup ROM and saves the current ROM as a backup, enabling you to switch easily to the alternate ROM version if the new ROM becomes corrupted for any reason. This feature protects the existing ROM version, even if you experience a power failure while flashing the ROM.

Keeping the system current

Drivers

IMPORTANT: Always perform a backup before installing or updating device drivers.

The server includes new hardware that may not have driver support on all OS installation media.

If you are installing an Intelligent Provisioning-supported OS, use Intelligent Provisioning (on page 99) and its Configure and Install feature to install the OS and latest supported drivers.

If you do not use Intelligent Provisioning to install an OS, drivers for some of the new hardware are required. These drivers, as well as other option drivers, ROM images, and value-add software can be downloaded as part of an SPP.

If you are installing drivers from SPP, be sure that you are using the latest SPP version that your server supports. To verify that your server is using the latest supported version and for more information about SPP, see the HP website (http://www.hp.com/go/spp/download).

To locate the drivers for a particular server, go to the HP website (http://www.hp.com/go/hpsc) and click on **Drivers, Software & Firmware**. Then, enter your product name in the **Find an HP product** field and click **Go**.

Software and firmware

Software and firmware should be updated before using the server for the first time, unless any installed software or components require an older version.

For system software and firmware updates, use one of the following sources:

- Download the SPP ("HP Service Pack for ProLiant" on page 102) from the HP Service Pack for ProLiant download page (http://www.hp.com/go/spp).
- Download individual drivers, firmware, or other systems software components from the server product page in the HP Support Center (http://www.hp.com/go/hpsc).

Version control

The VCRM and VCA are web-enabled Insight Management Agents tools that HP SIM uses to schedule software update tasks to the entire enterprise.

- VCRM manages the repository for SPP. Administrators can view the SPP contents or configure VCRM to automatically update the repository with internet downloads of the latest software and firmware from HP.

- VCA compares installed software versions on the node with updates available in the VCRM managed repository. Administrators configure VCA to point to a repository managed by VCRM.

For more information about version control tools, see the *HP Systems Insight Manager User Guide*, the *HP Version Control Agent User Guide*, and the *HP Version Control Repository User Guide* on the HP website (http://www.hp.com/go/hpsim).

HP operating systems and virtualization software support for ProLiant servers

For information about specific versions of a supported operating system, see the HP website (http://www.hp.com/go/ossupport).

HP Technology Service Portfolio

HP Technology Services offers a targeted set of consultancy, deployment, and service solutions to meet the support needs of most business and IT environments.

Foundation Care services—Delivers scalable hardware and software support packages for HP ProLiant server and industry-standard software. You can choose the type and level of service that is most suitable for your business needs.

HP Collaborative Support—With a single call, HP addresses initial hardware and software support needs and helps to quickly identify if a problem is related to hardware or software. If the problem is related to hardware, HP resolves the problem according to service level commitments. If the reported incident is related to an HP software product or a supported third-party software product and cannot be resolved by applying known fixes, HP contacts the third-party vendor and creates a problem incident on your behalf.

HP Proactive Care—For customers running business critical environments where downtime is not an option, HP Proactive Care helps to deliver high levels of availability. Key to these service options is the delivery of proactive service management tools to help you avoid the causes of downtime. If a problem arises, then HP offers advanced technical response from critical system support specialists for problem identification and resolution.

HP Support Center—For all service options, the HP Support Center delivers the information, tools, and experts required to support HP business products.

HP Insight Remote Support—Provides 24x7 secure remote monitoring, diagnosis, and problem resolution.

For more information, see one of the following websites:

- HP ProLiant Server Services website (http://www.hp.com/services/proliant)
- HP BladeSystem Services website (http://www.hp.com/services/bladesystem)

Change control and proactive notification

HP offers Change Control and Proactive Notification to notify customers 30 to 60 days in advance of upcoming hardware and software changes on HP commercial products.

For more information, refer to the HP website (http://www.hp.com/go/pcn).

Troubleshooting

Troubleshooting resources

The *HP ProLiant Gen8 Troubleshooting Guide, Volume I: Troubleshooting* provides procedures for resolving common problems and comprehensive courses of action for fault isolation and identification, issue resolution, and software maintenance on ProLiant servers and server blades. To view the guide, select a language:

- English (http://www.hp.com/support/ProLiant_TSG_v1_en)
- French (http://www.hp.com/support/ProLiant_TSG_v1_fr)
- Spanish (http://www.hp.com/support/ProLiant_TSG_v1_sp)
- German (http://www.hp.com/support/ProLiant_TSG_v1_gr)
- Japanese (http://www.hp.com/support/ProLiant_TSG_v1_jp)
- Simplified Chinese (http://www.hp.com/support/ProLiant_TSG_v1_sc)

The *HP ProLiant Gen8 Troubleshooting Guide, Volume II: Error Messages* provides a list of error messages and information to assist with interpreting and resolving error messages on ProLiant servers and server blades. To view the guide, select a language:

- English (http://www.hp.com/support/ProLiant_EMG_v1_en)
- French (http://www.hp.com/support/ProLiant_EMG_v1_fr)
- Spanish (http://www.hp.com/support/ProLiant_EMG_v1_sp)
- German (http://www.hp.com/support/ProLiant_EMG_v1_gr)
- Japanese (http://www.hp.com/support/ProLiant_EMG_v1_jp)
- Simplified Chinese (http://www.hp.com/support/ProLiant_EMG_v1_sc)

System battery replacement

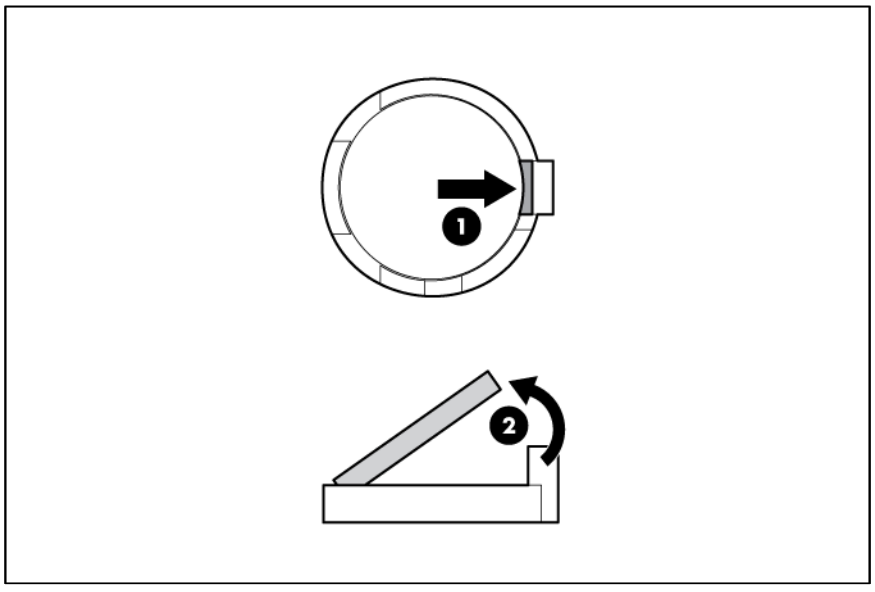
If the server no longer automatically displays the correct date and time, you might have to replace the battery that provides power to the real-time clock. Under normal use, battery life is 5 to 10 years.

⚠ **WARNING:** The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose the battery to temperatures higher than 60°C (140°F).
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
- Replace only with the spare designated for this product.

To remove the component:

1. Power down the server (on page 19).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Do one of the following:
   - Extend the server from the rack (on page 19).
   - Remove the server from the rack (on page 21).
4. Remove the access panel (on page 22).
5. Remove the PCI riser cage ("Remove the PCI riser cages" on page 24).
6. Locate the battery on the system board ("System board components" on page 12).
7. Remove the battery.



IMPORTANT: Replacing the system board battery resets the system ROM to its default configuration. After replacing the battery, reconfigure the system through RBSU.

To replace the component, reverse the removal procedure.

For more information about battery replacement or proper disposal, contact an authorized reseller or an authorized service provider.

Regulatory information

Safety and regulatory compliance

For safety, environmental, and regulatory information, see *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the HP website (http://www.hp.com/support/Safety-Compliance-EnterpriseProducts).

Turkey RoHS material content declaration

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Ukraine RoHS material content declaration

Обладнання відповідає вимогам Технічного регламенту щодо обмеження використання деяких небезпечних речовин в електричному та електронному обладнанні, затвердженого постановою Кабінету Міністрів України від 3 грудня 2008 № 1057

Warranty information

HP ProLiant and X86 Servers and Options (http://www.hp.com/support/ProLiantServers-Warranties)

HP Enterprise Servers (http://www.hp.com/support/EnterpriseServers-Warranties)

HP Storage Products (http://www.hp.com/support/Storage-Warranties)

HP Networking Products (http://www.hp.com/support/Networking-Warranties)

Electrostatic discharge

Preventing electrostatic discharge

To prevent damaging the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

Grounding methods to prevent electrostatic discharge

Several methods are used for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ±10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an authorized reseller install the part.

For more information on static electricity or assistance with product installation, contact an authorized reseller.

Specifications

Environmental specifications

Specification	Value
Temperature range*	
Operating	10°C to 35°C (50°F to 95°F)
Non-operating	-30°C to 60°C (-22°F to 140°F)
Relative humidity (non-condensing)	
Operating, maximum wet bulb temperature of 28°C (82.4°F)	10% to 90%
Non-operating, maximum wet bulb temperature of 38.7°C (101.7°F)	5% to 95%

* All temperature ratings shown are for sea level. An altitude derating of 1°C per 304.8 m (1.8°F per 1,000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed.

Mechanical specifications

Dimensions	Value
Height	8.75 cm (3.44 in)
Depth for models with SFF drive cage	69.85 cm (27.5 in)
Depth for models with LFF drive cage	74.93 cm (29.5 in)
Width	44.54 cm (17.54 in)
Weight (approximate range)	—
8 SFF drive model	16.13 kg to 22.20 kg (35.59 lb to 48.98 lb)
8 LFF drive model	16.87 kg to 26.66 kg (37.23 lb to 58.83 lb)
8+8 SFF drive model	17.99 kg to 24.34 kg (39.7 lb to 53.71 lb)

Power supply specifications

Depending on installed options, the server is configured with one of the following power supplies:

- HP 460 W CS Gold Hot-plug Power Supply (92% efficiency) (on page 115)
- HP 460 W CS Platinum Hot-plug Power Supply (94% efficiency) (on page 115)
- HP 460 W CS Platinum Plus Hot-plug Power Supply (94% efficiency) (on page 116)
- HP 750 W CS Gold Hot-plug Power Supply (92% efficiency) (on page 116)
- HP 750 W CS Platinum Hot-plug Power Supply (94% efficiency) (on page 117)
- HP 750 W CS Platinum Plus Hot-plug Power Supply (94% efficiency) (on page 117)

- HP 750 W CS Titanium Hot-plug Power Supply (96% efficiency) (on page 117)
- HP 750 W CS -48 V DC Hot-plug Power Supply (94% efficiency) (on page 118)
- HP 1200 W CS Platinum Plus Hot-plug Power Supply (94% efficiency) (on page 119)

For detailed power supply specifications, see the QuickSpecs on the HP website (http://h18000.www1.hp.com/products/quickspecs/14209_div/14209_div.html).

CAUTION: Check the system and power supply input ratings before powering up the server.

HP 460 W CS Gold Hot-plug Power Supply (92% efficiency)

Specification	Value
Input requirements	—
Rated input voltage	100 V AC to 240 V AC
Rated input frequency	50 Hz to 60 Hz
Rated input current	6 A to 3 A
Rated input power	526 W at 100 V AC input 505 W at 200 V AC input
Btu per hour	1794 at 100 V AC input 1725 at 200 V AC input
Power supply output	—
Rated steady-state power	460 W at 100 V to 120 V AC input 460 W at 200 V to 240 V AC input
Maximum peak power	460 W at 100 V to 120 V AC input 460 W at 200 V to 240 V AC input

HP 460 W CS Platinum Hot-plug Power Supply (94% efficiency)

Specification	Value
Input requirements	—
Rated input voltage	100 V AC to 240 V AC
Rated input frequency	50 Hz to 60 Hz
Rated input current	6 A to 3 A AC input
Rated input power	517 W at 100 V AC input 496 W at 200 V AC input
Btu per hour	1764 at 100 V AC input 1736 at 120 V AC input 1694 at 200 V AC input 1692 at 208 V AC input 1689 at 220 V AC input 1687 at 230 V AC input 1686 at 240 V AC input

Power supply output	—
Rated steady-state power	460 W at 100 V to 240 V AC input
Maximum peak power	460 W at 100 V to 240 V AC input

HP 460 W CS Platinum Plus Hot-plug Power Supply (94% efficiency)

Specification	Value
Input requirements	—
Rated input voltage	100 V AC to 240 V AC
Rated input frequency	50 Hz to 60 Hz
Rated input current	6 A to 3 A
Rated input power	509 W at 115 V AC input 495 W at 230 V AC input
Btu per hour	1764 at 100 V AC input 1736 at 115 V AC input 1694 at 200 V AC input 1687 at 230 V AC input
Power supply output	—
Rated steady-state power	460 W at 100 V to 120 V AC input 460 W at 200 V to 240 V AC input
Maximum peak power	460 W at 100 V to 120 V AC input 460 W at 200 V to 240 V AC input

HP 750 W CS Gold Hot-plug Power Supply (92% efficiency)

Specification	Value
Input requirements	—
Rated input voltage	100 V AC to 240 V AC
Rated input frequency	50 Hz to 60 Hz
Rated input current	9 A to 4.5 A
Rated input power	857 W at 100 V AC input 824 W at 200 V AC input
Btu per hour	2925 at 100 V AC input 2812 at 200 V AC input
Power supply output	—
Rated steady-state power	750 W at 100 V to 120 V AC input 750 W at 200 V to 240 V AC input
Maximum peak power	750 W at 100 V to 120 V AC input 750 W at 200 V to 240 V AC input

HP 750 W CS Platinum Hot-plug Power Supply (94% efficiency)

Specification	Value
Input requirements	—
Rated input voltage	100 V AC to 240 V AC
Rated input frequency	50 Hz to 60 Hz
Rated input current	9 A to 4.5 A AC input
Maximum rated input power	843 W at 100 V AC input 811 W at 200 V AC input
Btu per hour	2878 at 100 V AC input 2834 at 120 V AC input 2769 at 200 V AC input 2766 at 208 V AC input 2762 at 220 V AC input 2758 at 230 V AC input 2803 at 240 V AC input
Power supply output	—
Rated steady-state power	750 W at 100 V to 240 V AC input
Maximum peak power	750 W at 100 V to 240 V AC input

HP 750 W CS Platinum Plus Hot-plug Power Supply (94% efficiency)

Specification	Value
Input requirements	—
Rated input voltage	100 V AC to 240 V AC
Rated input frequency	50 Hz to 60 Hz
Rated input current	9 A to 4.5 A
Maximum rated input power	831 W at 115 V AC input 808 W at 230 V AC input
Btu per hour	2878 at 100 V AC input 2834 at 115 V AC input 2769 at 200 V AC input 2758 at 230 V AC input
Power supply output	—
Rated steady-state power	750 W at 100 V to 120 V AC input 750 W at 200 V to 240 V AC input
Maximum peak power	750 W at 100 V to 120 V AC input 750 W at 200 V to 240 V AC input

HP 750 W CS Titanium Hot-plug Power Supply (96% efficiency)

Specification	Value
Input requirements	—
Rated input voltage	200 V AC to 240 V AC

Rated input frequency	50 Hz to 60 Hz
Rated input current	4.1 A
Maximum rated input power	803 W at 200 V AC input 798 W at 240 V AC input
Btu per hour	2739 at 200 V AC input 2735 at 208 V AC input 2731 at 220 V AC input 2728 at 230 V AC input 2724 at 240 V AC input
Power supply output	—
Rated steady-state power	750 W at 200 V to 240 V AC input
Maximum peak power	750 W at 200 V to 240 V AC input

HP 750 W CS -48 V DC Hot-plug Power Supply (94% efficiency)

Specification	Value
Input requirements	—
Rated input voltage	-36 V DC to -72 V DC -48 V DC nominal input
Rated input current	23 A at -36 V DC input 17 A at -48 V DC input, nominal input 11 A at -72 V DC input
Rated input power (W)	815 W at -36 V DC input 805 W at -48 V DC input, nominal input 795 W at -72 V DC input
Btu per hour	2780 at -36 V DC input 2740 at -48 V DC input, nominal input 2720 at -72 V DC input
Power supply output	—
Rated steady-state power (W)	750 W
Maximum peak power (W)	750 W

△ **CAUTION:** This equipment is designed to permit the connection of the earthed conductor of the DC supply circuit to the earthing conductor at the equipment.
If this connection is made, all of the following must be met:

- This equipment must be connected directly to the DC supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the DC supply system earthing electrode conductor is connected.
- This equipment must be located in the same immediate area (such as adjacent cabinets) as any other equipment that has a connection between the earthed conductor of the same DC supply circuit and the earthing conductor, and also the point of earthing of the DC system. The DC system must be earthed elsewhere.
- The DC supply source is to be located within the same premises as the equipment.
- Switching or disconnecting devices must not be in the earthed circuit conductor between the DC source and the point of connection of the earthing electrode conductor.

CAUTION: To reduce the risk of electric shock or energy hazards:

- This equipment must be installed by trained service personnel, as defined by the NEC and IEC 60950-1, Second Edition, the standard for Safety of Information Technology Equipment.
- Connect the equipment to a reliably grounded SELV source. An SELV source is a secondary circuit that is designed so normal and single fault conditions do not cause the voltages to exceed a safe level (60 V DC).
- The branch circuit overcurrent protection must be rated 24 A.

HP 1200 W CS Platinum Plus Hot-plug Power Supply (94% efficiency)

Specification	Value
Input requirements	—
Rated input voltage	100 V AC 110 V AC to 120 V AC 200 V AC to 240 V AC
Rated input frequency	50 Hz to 60 Hz
Rated input current	9.1 A at 100 V AC 8.6 A at 110 V AC 6.7 A at 200 V AC
Maximum rated input power	897 W at 100 V AC input 1321 W at 200 V AC input
Btu per hour	3061 at 100 V AC input 4506 at 200 V AC input
Power supply output	—
Rated steady-state power	800 W at 100 V AC input 900 W at 120 V AC input 1200 W at 200 V to 240 V AC input
Maximum peak power	800 W at 100 V AC input 900 W at 120 V AC input 1200 W at 200 V to 240 V AC input

Hot-plug power supply calculations

For hot-plug power supply specifications and calculators to determine electrical and heat loading for the server, see the HP Power Advisor website (http://www.hp.com/go/hppoweradvisor).

Support and other resources

Before you contact HP

Be sure to have the following information available before you call HP:

- Active Health System log (HP ProLiant Gen8 or later products)

  Download and have available an Active Health System log for 3 days before the failure was detected. For more information, see the *HP iLO 4 User Guide* or *HP Intelligent Provisioning User Guide* on the HP website (http://www.hp.com/go/ilo/docs).
- Onboard Administrator SHOW ALL report (for HP BladeSystem products only)

  For more information on obtaining the Onboard Administrator SHOW ALL report, see the HP website (http://www.hp.com/go/OAlog).
- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Product identification number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP contact information

For United States and worldwide contact information, see the Contact HP website (http://www.hp.com/go/assistance).

In the United States:

- To contact HP by phone, call 1-800-334-5144. For continuous quality improvement, calls may be recorded or monitored.
- If you have purchased a Care Pack (service upgrade), see the Support & Drivers website (http://www8.hp.com/us/en/support-drivers.html). If the problem cannot be resolved at the website, call 1-800-633-3600. For more information about Care Packs, see the HP website (http://pro-aq-sama.houston.hp.com/services/cache/10950-0-0-225-121.html).

Customer Self Repair

HP products are designed with many Customer Self Repair (CSR) parts to minimize repair time and allow for greater flexibility in performing defective parts replacement. If during the diagnosis period HP (or HP service

providers or service partners) identifies that the repair can be accomplished by the use of a CSR part, HP will ship that part directly to you for replacement. There are two categories of CSR parts:

- **Mandatory**—Parts for which customer self repair is mandatory. If you request HP to replace these parts, you will be charged for the travel and labor costs of this service.
- **Optional**—Parts for which customer self repair is optional. These parts are also designed for customer self repair. If, however, you require that HP replace them for you, there may or may not be additional charges, depending on the type of warranty service designated for your product.

NOTE: Some HP parts are not designed for customer self repair. In order to satisfy the customer warranty, HP requires that an authorized service provider replace the part. These parts are identified as "No" in the Illustrated Parts Catalog.

Based on availability and where geography permits, CSR parts will be shipped for next business day delivery. Same day or four-hour delivery may be offered at an additional charge where geography permits. If assistance is required, you can call the HP Technical Support Center and a technician will help you over the telephone. HP specifies in the materials shipped with a replacement CSR part whether a defective part must be returned to HP. In cases where it is required to return the defective part to HP, you must ship the defective part back to HP within a defined period of time, normally five (5) business days. The defective part must be returned with the associated documentation in the provided shipping material. Failure to return the defective part may result in HP billing you for the replacement. With a customer self repair, HP will pay all shipping and part return costs and determine the courier/carrier to be used.

For more information about HP's Customer Self Repair program, contact your local service provider. For the North American program, refer to the HP website (http://www.hp.com/go/selfrepair).

Réparation par le client (CSR)

Les produits HP comportent de nombreuses pièces CSR (Customer Self Repair = réparation par le client) afin de minimiser les délais de réparation et faciliter le remplacement des pièces défectueuses. Si pendant la période de diagnostic, HP (ou ses partenaires ou mainteneurs agréés) détermine que la réparation peut être effectuée à l'aide d'une pièce CSR, HP vous l'envoie directement. Il existe deux catégories de pièces CSR:

Obligatoire - Pièces pour lesquelles la réparation par le client est obligatoire. Si vous demandez à HP de remplacer ces pièces, les coûts de déplacement et main d'œuvre du service vous seront facturés.

Facultatif - Pièces pour lesquelles la réparation par le client est facultative. Ces pièces sont également conçues pour permettre au client d'effectuer lui-même la réparation. Toutefois, si vous demandez à HP de remplacer ces pièces, l'intervention peut ou non vous être facturée, selon le type de garantie applicable à votre produit.

REMARQUE: Certaines pièces HP ne sont pas conçues pour permettre au client d'effectuer lui-même la réparation. Pour que la garantie puisse s'appliquer, HP exige que le remplacement de la pièce soit effectué par un Mainteneur Agréé. Ces pièces sont identifiées par la mention "Non" dans le Catalogue illustré.

Les pièces CSR sont livrées le jour ouvré suivant, dans la limite des stocks disponibles et selon votre situation géographique. Si votre situation géographique le permet et que vous demandez une livraison le jour même ou dans les 4 heures, celle-ci vous sera facturée. Pour bénéficier d'une assistance téléphonique, appelez le Centre d'assistance technique HP. Dans les documents envoyés avec la pièce de rechange CSR, HP précise s'il est nécessaire de lui retourner la pièce défectueuse. Si c'est le cas, vous devez le faire dans le délai indiqué, généralement cinq (5) jours ouvrés. La pièce et sa documentation doivent être retournées dans l'emballage fourni. Si vous ne retournez pas la pièce défectueuse, HP se réserve le droit de vous facturer les coûts de remplacement. Dans le cas d'une pièce CSR, HP supporte l'ensemble des frais d'expédition et de retour, et détermine la société de courses ou le transporteur à utiliser.

Pour plus d'informations sur le programme CSR de HP, contactez votre Mainteneur Agrée local. Pour plus d'informations sur ce programme en Amérique du Nord, consultez le site Web HP (http://www.hp.com/go/selfrepair).

Riparazione da parte del cliente

Per abbreviare i tempi di riparazione e garantire una maggiore flessibilità nella sostituzione di parti difettose, i prodotti HP sono realizzati con numerosi componenti che possono essere riparati direttamente dal cliente (CSR, Customer Self Repair). Se in fase di diagnostica HP (o un centro di servizi o di assistenza HP) identifica il guasto come riparabile mediante un ricambio CSR, HP lo spedirà direttamente al cliente per la sostituzione. Vi sono due categorie di parti CSR:

Obbligatorie – Parti che devono essere necessariamente riparate dal cliente. Se il cliente ne affida la riparazione ad HP, deve sostenere le spese di spedizione e di manodopera per il servizio.

Opzionali – Parti la cui riparazione da parte del cliente è facoltativa. Si tratta comunque di componenti progettati per questo scopo. Se tuttavia il cliente ne richiede la sostituzione ad HP, potrebbe dover sostenere spese addizionali a seconda del tipo di garanzia previsto per il prodotto.

NOTA: alcuni componenti HP non sono progettati per la riparazione da parte del cliente. Per rispettare la garanzia, HP richiede che queste parti siano sostituite da un centro di assistenza autorizzato. Tali parti sono identificate da un "No" nel Catalogo illustrato dei componenti.

In base alla disponibilità e alla località geografica, le parti CSR vengono spedite con consegna entro il giorno lavorativo seguente. La consegna nel giorno stesso o entro quattro ore è offerta con un supplemento di costo solo in alcune zone. In caso di necessità si può richiedere l'assistenza telefonica di un addetto del centro di supporto tecnico HP. Nel materiale fornito con una parte di ricambio CSR, HP specifica se il cliente deve restituire dei componenti. Qualora sia richiesta la resa ad HP del componente difettoso, lo si deve spedire ad HP entro un determinato periodo di tempo, generalmente cinque (5) giorni lavorativi. Il componente difettoso deve essere restituito con la documentazione associata nell'imballo di spedizione fornito. La mancata restituzione del componente può comportare la fatturazione del ricambio da parte di HP. Nel caso di riparazione da parte del cliente, HP sostiene tutte le spese di spedizione e resa e sceglie il corriere/vettore da utilizzare.

Per ulteriori informazioni sul programma CSR di HP contattare il centro di assistenza di zona. Per il programma in Nord America fare riferimento al sito Web HP (http://www.hp.com/go/selfrepair).

Customer Self Repair

HP Produkte enthalten viele CSR-Teile (Customer Self Repair), um Reparaturzeiten zu minimieren und höhere Flexibilität beim Austausch defekter Bauteile zu ermöglichen. Wenn HP (oder ein HP Servicepartner) bei der Diagnose feststellt, dass das Produkt mithilfe eines CSR-Teils repariert werden kann, sendet Ihnen HP dieses Bauteil zum Austausch direkt zu. CSR-Teile werden in zwei Kategorien unterteilt:

Zwingend – Teile, für die das Customer Self Repair-Verfahren zwingend vorgegeben ist. Wenn Sie den Austausch dieser Teile von HP vornehmen lassen, werden Ihnen die Anfahrt- und Arbeitskosten für diesen Service berechnet.

Optional – Teile, für die das Customer Self Repair-Verfahren optional ist. Diese Teile sind auch für Customer Self Repair ausgelegt. Wenn Sie jedoch den Austausch dieser Teile von HP vornehmen lassen möchten, können bei diesem Service je nach den für Ihr Produkt vorgesehenen Garantiebedingungen zusätzliche Kosten anfallen.

HINWEIS: Einige Teile sind nicht für Customer Self Repair ausgelegt. Um den Garantieanspruch des Kunden zu erfüllen, muss das Teil von einem HP Servicepartner ersetzt werden. Im illustrierten Teilekatalog sind diese Teile mit „No“ bzw. „Nein“ gekennzeichnet.

CSR-Teile werden abhängig von der Verfügbarkeit und vom Lieferziel am folgenden Geschäftstag geliefert. Für bestimmte Standorte ist eine Lieferung am selben Tag oder innerhalb von vier Stunden gegen einen Aufpreis verfügbar. Wenn Sie Hilfe benötigen, können Sie das HP technische Support Center anrufen und sich von einem Mitarbeiter per Telefon helfen lassen. Den Materialien, die mit einem CSR-Ersatzteil geliefert werden, können Sie entnehmen, ob das defekte Teil an HP zurückgeschickt werden muss. Wenn es erforderlich ist, das defekte Teil an HP zurückzuschicken, müssen Sie dies innerhalb eines vorgegebenen Zeitraums tun, in der Regel innerhalb von fünf (5) Geschäftstagen. Das defekte Teil muss mit der zugehörigen Dokumentation in der Verpackung zurückgeschickt werden, die im Lieferumfang enthalten ist. Wenn Sie das defekte Teil nicht zurückschicken, kann HP Ihnen das Ersatzteil in Rechnung stellen. Im Falle von Customer Self Repair kommt HP für alle Kosten für die Lieferung und Rücksendung auf und bestimmt den Kurier-/Frachtdienst.

Weitere Informationen über das HP Customer Self Repair Programm erhalten Sie von Ihrem Servicepartner vor Ort. Informationen über das CSR-Programm in Nordamerika finden Sie auf der HP Website unter (http://www.hp.com/go/selfrepair).

Reparaciones del propio cliente

Los productos de HP incluyen muchos componentes que el propio usuario puede reemplazar (*Customer Self Repair*, CSR) para minimizar el tiempo de reparación y ofrecer una mayor flexibilidad a la hora de realizar sustituciones de componentes defectuosos. Si, durante la fase de diagnóstico, HP (o los proveedores o socios de servicio de HP) identifica que una reparación puede llevarse a cabo mediante el uso de un componente CSR, HP le enviará dicho componente directamente para que realice su sustitución. Los componentes CSR se clasifican en dos categorías:

- **Obligatorio:** componentes para los que la reparación por parte del usuario es obligatoria. Si solicita a HP que realice la sustitución de estos componentes, tendrá que hacerse cargo de los gastos de desplazamiento y de mano de obra de dicho servicio.
- **Opcional:** componentes para los que la reparación por parte del usuario es opcional. Estos componentes también están diseñados para que puedan ser reparados por el usuario. Sin embargo, si precisa que HP realice su sustitución, puede o no conllevar costes adicionales, dependiendo del tipo de servicio de garantía correspondiente al producto.

NOTA: Algunos componentes no están diseñados para que puedan ser reparados por el usuario. Para que el usuario haga valer su garantía, HP pone como condición que un proveedor de servicios autorizado realice la sustitución de estos componentes. Dichos componentes se identifican con la palabra "No" en el catálogo ilustrado de componentes.

Según la disponibilidad y la situación geográfica, los componentes CSR se enviarán para que lleguen a su destino al siguiente día laborable. Si la situación geográfica lo permite, se puede solicitar la entrega en el mismo día o en cuatro horas con un coste adicional. Si precisa asistencia técnica, puede llamar al Centro de asistencia técnica de HP y recibirá ayuda telefónica por parte de un técnico. Con el envío de materiales para la sustitución de componentes CSR, HP especificará si los componentes defectuosos deberán devolverse a HP. En aquellos casos en los que sea necesario devolver algún componente a HP, deberá hacerlo en el periodo de tiempo especificado, normalmente cinco días laborables. Los componentes defectuosos deberán devolverse con toda la documentación relacionada y con el embalaje de envío. Si no enviara el componente defectuoso requerido, HP podrá cobrarle por el de sustitución. En el caso de todas

sustituciones que lleve a cabo el cliente, HP se hará cargo de todos los gastos de envío y devolución de componentes y escogerá la empresa de transporte que se utilice para dicho servicio.

Para obtener más información acerca del programa de Reparaciones del propio cliente de HP, póngase en contacto con su proveedor de servicios local. Si está interesado en el programa para Norteamérica, visite la página web de HP siguiente (http://www.hp.com/go/selfrepair).

Customer Self Repair

Veel onderdelen in HP producten zijn door de klant zelf te repareren, waardoor de reparatieduur tot een minimum beperkt kan blijven en de flexibiliteit in het vervangen van defecte onderdelen groter is. Deze onderdelen worden CSR-onderdelen (Customer Self Repair) genoemd. Als HP (of een HP Service Partner) bij de diagnose vaststelt dat de reparatie kan worden uitgevoerd met een CSR-onderdeel, verzendt HP dat onderdeel rechtstreeks naar u, zodat u het defecte onderdeel daarmee kunt vervangen. Er zijn twee categorieën CSR-onderdelen:

Verplicht: Onderdelen waarvoor reparatie door de klant verplicht is. Als u HP verzoekt deze onderdelen voor u te vervangen, worden u voor deze service reiskosten en arbeidsloon in rekening gebracht.

Optioneel: Onderdelen waarvoor reparatie door de klant optioneel is. Ook deze onderdelen zijn ontworpen voor reparatie door de klant. Als u echter HP verzoekt deze onderdelen voor u te vervangen, kunnen daarvoor extra kosten in rekening worden gebracht, afhankelijk van het type garantieservice voor het product.

OPMERKING: Sommige HP onderdelen zijn niet ontwikkeld voor reparatie door de klant. In verband met de garantievoorwaarden moet het onderdeel door een geautoriseerde Service Partner worden vervangen. Deze onderdelen worden in de geïllustreerde onderdelencatalogus aangemerkt met "Nee".

Afhankelijk van de leverbaarheid en de locatie worden CSR-onderdelen verzonden voor levering op de eerstvolgende werkdag. Levering op dezelfde dag of binnen vier uur kan tegen meerkosten worden aangeboden, indien dit mogelijk is gezien de locatie. Indien assistentie gewenst is, belt u een HP Service Partner om via de telefoon technische ondersteuning te ontvangen. HP vermeldt in de documentatie bij het vervangende CSR-onderdeel of het defecte onderdeel aan HP moet worden geretourneerd. Als het defecte onderdeel aan HP moet worden teruggezonden, moet u het defecte onderdeel binnen een bepaalde periode, gewoonlijk vijf (5) werkdagen, retourneren aan HP. Het defecte onderdeel moet met de bijbehorende documentatie worden geretourneerd in het meegeleverde verpakkingsmateriaal. Als u het defecte onderdeel niet terugzendt, kan HP u voor het vervangende onderdeel kosten in rekening brengen. Bij reparatie door de klant betaalt HP alle verzendkosten voor het vervangende en geretourneerde onderdeel en kiest HP zelf welke koerier/transportonderneming hiervoor wordt gebruikt.

Neem contact op met een Service Partner voor meer informatie over het Customer Self Repair programma van HP. Informatie over Service Partners vindt u op de HP website (http://www.hp.com/go/selfrepair).

Reparo feito pelo cliente

Os produtos da HP são projetados com muitas peças para reparo feito pelo cliente (CSR) de modo a minimizar o tempo de reparo e permitir maior flexibilidade na substituição de peças com defeito. Se, durante o período de diagnóstico, a HP (ou fornecedores/parceiros de serviço da HP) concluir que o reparo pode ser efetuado pelo uso de uma peça CSR, a peça de reposição será enviada diretamente ao cliente. Existem duas categorias de peças CSR:

Obrigatória – Peças cujo reparo feito pelo cliente é obrigatório. Se desejar que a HP substitua essas peças, serão cobradas as despesas de transporte e mão-de-obra do serviço.

Opcional – Peças cujo reparo feito pelo cliente é opcional. Essas peças também são projetadas para o reparo feito pelo cliente. No entanto, se desejar que a HP as substitua, pode haver ou não a cobrança de taxa adicional, dependendo do tipo de serviço de garantia destinado ao produto.

OBSERVAÇÃO: Algumas peças da HP não são projetadas para o reparo feito pelo cliente. A fim de cumprir a garantia do cliente, a HP exige que um técnico autorizado substitua a peça. Essas peças estão identificadas com a marca "No" (Não), no catálogo de peças ilustrado.

Conforme a disponibilidade e o local geográfico, as peças CSR serão enviadas no primeiro dia útil após o pedido. Onde as condições geográficas permitirem, a entrega no mesmo dia ou em quatro horas pode ser feita mediante uma taxa adicional. Se precisar de auxílio, entre em contato com o Centro de suporte técnico da HP para que um técnico o ajude por telefone. A HP especifica nos materiais fornecidos com a peça CSR de reposição se a peça com defeito deve ser devolvida à HP. Nos casos em que isso for necessário, é preciso enviar a peça com defeito à HP dentro do período determinado, normalmente cinco (5) dias úteis. A peça com defeito deve ser enviada com a documentação correspondente no material de transporte fornecido. Caso não o faça, a HP poderá cobrar a reposição. Para as peças de reparo feito pelo cliente, a HP paga todas as despesas de transporte e de devolução da peça e determina a transportadora/serviço postal a ser utilizado.

Para obter mais informações sobre o programa de reparo feito pelo cliente da HP, entre em contato com o fornecedor de serviços local. Para o programa norte-americano, visite o site da HP (http://www.hp.com/go/selfrepair).

カスタマーセルフリペア

修理時間を短縮し、故障部品の交換における高い柔軟性を確保するために、HP製品には多数のCSR部品があります。診断の際に、CSR部品を使用すれば修理ができるとHP（HPまたはHP正規保守代理店）が判断した場合、HPはその部品を直接、お客様に発送し、お客様に交換していただきます。CSR部品には以下の2通りがあります。

- **必須 -** カスタマーセルフリペアが必須の部品。当該部品について、もしもお客様がHPに交換作業を依頼される場合には、その修理サービスに関する交通費および人件費がお客様に請求されます。
- **任意 -** カスタマーセルフリペアが任意である部品。この部品もカスタマーセルフリペア用です。当該部品について、もしもお客様がHPに交換作業を依頼される場合には、お買い上げの製品に適用される保証サービス内容の範囲内においては、別途費用を負担していただくことなく保証サービスを受けることができます。

注： HP製品の一部の部品は、カスタマーセルフリペア用ではありません。製品の保証を継続するためには、HPまたはHP正規保守代理店による交換作業が必須となります。部品カタログには、当該部品がカスタマーセルフリペア除外品である旨が記載されています。

部品供給が可能な場合、地域によっては、CSR部品を翌営業日に届くように発送します。また、地域によっては、追加費用を負担いただくことにより同日または4時間以内に届くように発送することも可能な場合があります。サポートが必要なときは、HPの修理受付窓口に電話していただければ、技術者が電話でアドバイスします。交換用のCSR部品または同梱物には、故障部品をHPに返送する必要があるかどうかが表示されています。故障部品をHPに返送する必要がある場合は、指定期限内（通常は5営業日以内）に故障部品をHPに返送してください。故障部品を返送する場合は、届いた時の梱包箱に関連書類とともに入れてください。故障部品を返送しない場合、HPから部品費用が請求されます。カスタマーセルフリペアの際には、HPは送料および部品返送費を全額負担し、使用する宅配便会社や運送会社を指定します。

客户自行维修

HP 产品提供许多客户自行维修 (CSR) 部件，以尽可能缩短维修时间和在更换缺陷部件方面提供更大的灵活性。如果在诊断期间 HP（或 HP 服务提供商或服务合作伙伴）确定可以通过使用 CSR 部件完成维修，HP 将直接把该部件发送给您进行更换。有两类 CSR 部件：

- **强制性的** — 要求客户必须自行维修的部件。如果您请求 HP 更换这些部件，则必须为该服务支付差旅费和人工费用。
- **可选的** — 客户可以选择是否自行维修的部件。这些部件也是为客户自行维修设计的。不过，如果您要求 HP 为您更换这些部件，则根据为您的产品指定的保修服务类型，HP 可能收取或不再收取任何附加费用。

注：某些 HP 部件的设计并未考虑客户自行维修。为了满足客户保修的需要，HP 要求授权服务提供商更换相关部件。这些部件在部件图解目录中标记为“否”。

CSR 部件将在下一个工作日发运（取决于备货情况和允许的地理范围）。在允许的地理范围内，可在当天或四小时内发运，但要收取额外费用。如果需要帮助，您可以致电 HP 技术支持中心，将会有技术人员通过电话为您提供帮助。HP 会在随更换的 CSR 部件发运的材料中指明是否必须将有缺陷的部件返还给 HP。如果要求您将有缺陷的部件返还给 HP，那么您必须在规定期限内（通常是五 (5) 个工作日）将缺陷部件发给 HP。有缺陷的部件必须随所提供的发运材料中的相关文件一起返还。如果未能送还有缺陷的部件，HP 可能会要求您支付更换费用。客户自行维修时，HP 将承担所有相关运输和部件返回费用，并指定快递商/承运商。

有关 HP 客户自行维修计划的详细信息，请与您当地的服务提供商联系。有关北美地区的计划，请访问 HP 网站 (http://www.hp.com/go/selfrepair)。

客戶自行維修

HP 產品設計了許多「客戶自行維修」(CSR) 的零件以減少維修時間，並且使得更換瑕疵零件時能有更大的彈性。如果在診斷期間 HP（或 HP 服務供應商或維修夥伴）辨認出此項維修工作可以藉由使用 CSR 零件來完成，則 HP 將直接寄送該零件給您作更換。CSR 零件分為兩種類別：

- **強制的** — 客戶自行維修所使用的零件是強制性的。如果您要求 HP 更換這些零件，HP 將會向您收取此服務所需的外出費用與勞動成本。
- **選購的** — 客戶自行維修所使用的零件是選購的。這些零件也設計用於客戶自行維修之用。不過，如果您要求 HP 為您更換，則可能需要也可能不需要負擔額外的費用，端視針對此產品指定的保固服務類型而定。

備註：某些 HP 零件沒有消費者可自行維修的設計。為符合客戶保固，HP 需要授權的服務供應商更換零件。這些零件在圖示的零件目錄中，被標示為「否」。

基於材料取得及環境允許的情況下，CSR 零件將於下一個工作日以快遞寄送。在環境的允許下當天或四小時內送達，則可能需要額外的費用。若您需要協助，可致電「HP 技術支援中心」，會有一位技術人員透過電話來協助您。不論損壞的零件是否必須退回，HP 皆會在與 CSR 替換零件一起運送的材料中註明。若要將損壞的零件退回 HP，您必須在指定的一段時間內（通常為五 (5) 個工作天），將損壞的零件寄回 HP。損壞的零件必須與寄送資料中隨附的相關技術文件一併退還。如果無法退還損壞的零件，HP 可能要向您收取替換費用。針對客戶自行維修情形，HP 將負責所有運費及零件退還費用並指定使用何家快遞/貨運公司。

如需 HP 的「客戶自行維修」方案詳細資訊，請連絡您當地的服務供應商。至於北美方案，請參閱 HP 網站 (http://www.hp.com/go/selfrepair)。

고객 셀프 수리

HP 제품은 수리 시간을 최소화하고 결함이 있는 부품 교체 시 더욱 융통성을 발휘할 수 있도록 하기 위해 고객 셀프 수리(CSR) 부품을 다량 사용하여 설계되었습니다. 진단 기간 동안 HP(또는 HP 서비스 공급업체 또는 서비스 협력업체)에서 CSR 부품을 사용하여 수리가 가능하다고 판단되면 HP는 해당 부품을 바로 사용자에게 보내어 사용자가 교체할 수 있도록 합니다. CSR 부품에는 두 가지 종류가 있습니다.

- **고객 셀프 수리가 의무 사항인 필수 부품.** 사용자가 HP에 이 부품의 교체를 요청할 경우 이 서비스에 대한 출장비 및 작업비가 청구됩니다.
- **고객 셀프 수리가 선택 사항인 부품.** 이 부품들도 고객 셀프 수리가 가능하도록 설계되었습니다. 하지만 사용자가 HP에 이 부품의 교체를 요청할 경우 사용자가 구입한 제품에 해당하는 보증 서비스 유형에 따라 추가 비용 없이 교체가 가능할 수 있습니다.

참고: 일부 HP 부품은 고객 셀프 수리가 불가능하도록 설계되었습니다. HP는 만족스러운 고객 보증을 위해 공인 서비스 제공업체를 통해 부품을 교체하도록 하고 있습니다. 이러한 부품들은 Illustrated Parts Catalog에 "No"라고 표시되어 있습니다.

CSR 부품은 재고 상태와 지리적 조건이 허용하는 경우 다음 영업일 납품이 가능하도록 배송이 이루어집니다. 지리적 조건이 허용하는 경우 추가 비용이 청구되는 조건으로 당일 또는 4시간 배송이 가능할 수도 있습니다. 도움이 필요하시면 HP 기술 지원 센터로 전화하십시오. 전문 기술자가 전화로 도움을 줄 것입니다. HP는 결함이 발생한 부품을 HP로 반환해야 하는지 여부를 CSR 교체 부품과 함께 배송된 자료에 지정합니다. 결함이 발생한 부품을 HP로 반환해야 하는 경우에는 지정된 기간 내(통상 영업일 기준 5일)에 HP로 반환해야 합니다. 이 때 결함이 발생한 부품은 제공된 포장 재료에 넣어 관련 설명서와 함께 반환해야 합니다. 결함이 발생한 부품을 반환하지 않는 경우 HP가 교체 부품에 대해 비용을 청구할 수 있습니다. 고객 셀프 수리의 경우, HP는 모든 운송 및 부품 반환 비용을 부담하며 이용할 운송업체 및 택배 서비스를 결정합니다.

HP 고객 셀프 수리 프로그램에 대한 자세한 내용은 가까운 서비스 제공업체에 문의하십시오. 북미 지역의 프로그램에 대해서는 HP 웹 사이트(http://www.hp.com/go/selfrepair)를 참조하십시오.

Acronyms and abbreviations

ABEND

abnormal end

ACU

Array Configuration Utility

AHCI

Advanced Host Controller Interface

AMP

Advanced Memory Protection

ASR

Automatic Server Recovery

CSA

Canadian Standards Association

CSR

Customer Self Repair

DDDC

Double Device Data Correction

DDR3

double data rate-3

DPC

DIMMs per channel

EMI

electromagnetic interference

FBWC

flash-backed write cache

GPU

graphics processing unit

HP CS

HP Common Slot (power supply)

HP SIM

HP Systems Insight Manager

HP SUM

HP Smart Update Manager

IEC

International Electrotechnical Commission

iLO

Integrated Lights-Out

IML

Integrated Management Log

ISO

International Organization for Standardization

LFF

large form factor

LRDIMM

load reduced dual in-line memory module

LV DIMM

low-voltage DIMM

NMI

nonmaskable interrupt

NVRAM

nonvolatile memory

OA

Onboard Administrator

ORCA

Option ROM Configuration for Arrays

PCIe

Peripheral Component Interconnect Express

PDU

power distribution unit

POST

Power-On Self Test

PSU

power supply unit

PXE

preboot execution environment

RBSU

ROM-Based Setup Utility

RDIMM

registered dual in-line memory module

RDP

Rapid Deployment Pack

RoHS

Restriction of Hazardous Substances

SAS

serial attached SCSI

SATA

serial ATA

SD

Secure Digital

SDDC

Single Device Data Correction

SELV

separated extra low voltage

SFF

small form factor

SPP

HP Service Pack for ProLiant

SSA

HP Smart Storage Administrator

STD

standard (DIMM voltage)

TMRA

recommended ambient operating temperature

TPM

Trusted Platform Module

UDIMM

unregistered dual in-line memory module

UID

unit identification

USB

universal serial bus

VC

Virtual Connect

VCA

Version Control Agent

VCRM

Version Control Repository Manager

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